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Telephony.

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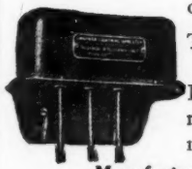

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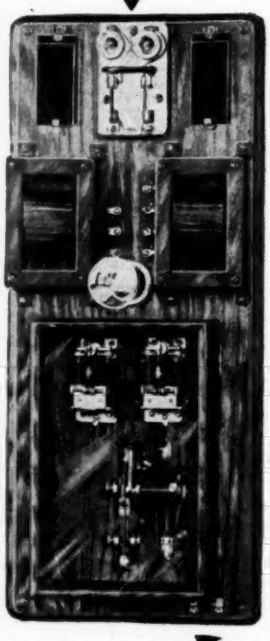

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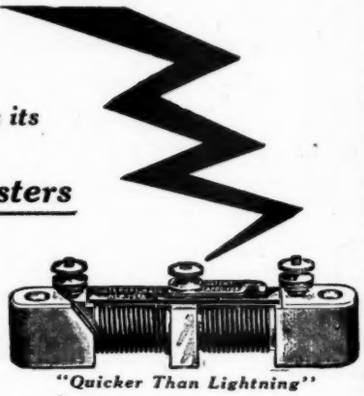

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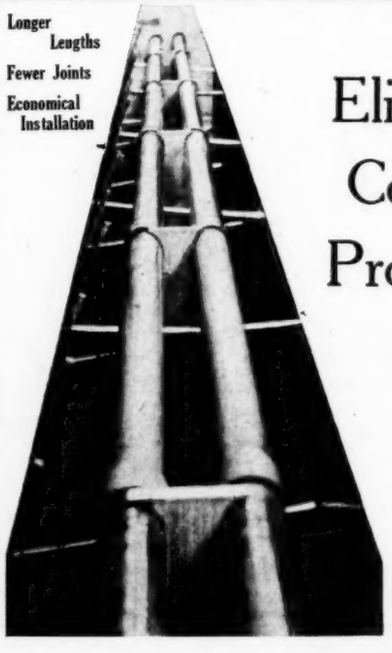

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THE AMERICAN TELEPHONE JOURNAL

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Bill, the Troubleman, says:

"I notice the Minnesota Railroad Commission has stopped the Bell from giving free telephone service in order to crush out Independent competition. That's a step in the right direction. A continuation of this policy will surely lead to an end of the Bell-Western Electric alliance."

Competition and the Telephone.

An editorial in a recent issue of Leslie's Magazine pays a fine tribute to the telephone. It follows:

"Telephone! The telephone has put a premium on truth! It therefore has a sentimental as well as a practical value. And the telephone's tremendous growth was largely created by systematic advertising. At least this is what Vice-President N. C. Kingsbury of the American Telephone & Telegraph Co. said in his recent address to the Associated Advertising Clubs of the World. He stated that the Bell telephone company had added 1,690,078 telephones between 1904 and 1908, but between 1908 and 1913, when its advertising campaign was under way. the company gained the enormous increase in subscribers of 2,200,000.

"The telephone is a truth creator because one must be careful of spoken words and see that he makes them good. Transactions occurring daily on the New York Stock Exchange involving millions of dollars are made over the telephone. In other fields of enterprise business transactions of prime importance are decided by a minute's conversation over the telephone. In social matters, births, deaths and marriages are announced, and visits arranged by telephone, so that in every play, and in almost every moving picture, the telephone necessarily has its part. It is the voice of the people and it is not surprising that to those who hear it for the first time, its messages are as mysterious as a voice from the unknown world."

No doubt the telephone has put a premium on truth. It is equally true that judicious advertising increases the demand for telephone service, as it stimulates the demand for anything that contributes to the comfort and welfare of mankind. It is worthy of note, however, that Mr. Kingsbury, the Bell official, ignored the factor which was the most powerful in increasing the number of telephones in the United States. That factor was *competition*—the competition from Independent telephone men. It was their activity which woke up the Bell and resulted in giving the people of this country the approximate 10,000,000 telephones now in use.

To prove this, one need only refer to the Bell chart which is found in the annual report of the American Telephone & Telegraph Co. In 1896, after 20 years of Bell monopoly, there were but 300,000 telephones in service. Competition began about then, and in the next two years the total number of stations in service jumped up to nearly 500,000. Before competition the Bell withheld service from thousands of people, and furnished it—at exorbitant rates—only to those whom it was convenient to serve. The Independents extended their lines everywhere and compelled the Bell to adopt a more liberal policy. Year by year, as competition continued, the number of telephones in service increased, until today this country has more instruments in use by far than any other part of the world.

Twenty years of Bell monopoly gave the United States 300,000 telephones. After 20 years of competition we have more than 10,000,000. *Competition did it.* Mr. Kingsbury and other Bell officials do not like to admit this. They prefer to give the credit to advertising—especially in a speech to advertising men.

Of course, we all know how the Bell has been spending millions for publicity in recent years in its efforts to distract attention from its unfair methods and with a view also to killing the movement for public ownership of telephones. Even so, if "the telephone puts a premium on truth," a telephone man like Mr. Kingsbury should be candid enough to give competition the credit due for the wonderful growth of the telephone business in the United States.

The Anvil Chorus

By HERBERT KAUFMAN

When Fortune knocks, Envy promptly follows suit. Every winning starts a whining. Disappointment often consoles itself with defamation and deprecation. Jealousy is a bitter cur, but seldom a biting one. So don't be disturbed by the bark of toothless brains.

It's mainly insignificant folks who resent the existence of accomplishments beyond their own range. The Adam family is notoriously reluctant to accept the superiority of any fellow. If failure would concede successes more graciously, they would soon learn to conceive them.

Only big men appreciate the merit of others—that's the quality which makes them great. To recognize genius is the next thing to possessing it. Ignorance and inefficiency are least ready to accord merit its due. The less a man knows, the wilder his jeers against knowledge. Vanity is intolerant of a better—the dog in the manger is Conceit's special pet.

Your progress is sure to arouse the resentment and provoke the hostility of numbers who secretly want what you have and wish to be what you are. An admission that you can honestly achieve beyond their capacities, necessitates a frank self-measurement to which few are willing to submit—demands a confession of inferiority. You can't put your name on all men's tongues without leaving a bitter taste in some of their mouths. The derision of fools and the mud-flinging of sore-heads is a standard penalty for ambition.

Distinction can only be gained through bold and positive courses. No decisive action ever lacked the disapproval of those who held opposite views, or who were profiting by the continuance of contrary conditions. Do your best and don't mind the rest. Assumption of power invites slander and malice—is a challenge to back-biters and dirt throwers.

It's a hopeless aspiration to escape the rut and misinterpretation. The most you can look for is a set of partisans sufficient to offset an inevitable batch of ill-wishers. Nonentities are not talked about—there's no subject for discussion.

People who are without enemies simply haven't attracted notice. You can't please everybody. No rule of conduct is acceptable to the entire community. The thief is hostile to honesty. Hypocrisy frowns upon frankness. Originality threatens the security of reactionaries. Wisdom exposes folly.

Right cannot prevail without thwarting wrong. The inauguration of an improvement unmasks the authorities who fail to fulfill their responsibilities. Shirkers can't be expected to applaud the example of zealous workers. Self-interest is a paramount trait in human nature, and is asserting itself when a displaced individual discounts the intelligence which thrashed him.

Generosity is a rare coin and stingily spent. Even when we have breadth enough to understand why we lost, egotism still insinuates that the other man didn't honestly earn his recognition. Bunglers have an arsenal of unworthy hints with which to explain the advancement of their associates. Mediocrity loves company and seeks to reduce its betters to the common level.

The road to the top is filled with muddy stretches. You can't escape them and "get there." A strong man cannot assert himself without trampling upon the aspirations of weaker opponents—therefore there's certain to be an outcry in his wake.

The only time you need begin to worry, is when you hear nothing but kind things about yourself. Then you can be sure that you are a "dead one"—of no one else do all speak gently.

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Some Interesting Anecdotes of a Telephone Troubleman

Experiences and Reflections of a Troubleman—How He Handled His First Case of Trouble and How He Learned the Importance of Being Careful in Little Things—Some Typical Cases of Trouble Encountered—Fascination in Shooting Trouble

By B. F. Van Tress

The experiences of troublemen engaged in telephone work have always been very interesting to me, as they appear in print from time to time. Some of the troubles with which I have come in contact in the 15 years in which telephone troubles have occupied a large part of my time, may be of interest to others.

I will never forget my first case of trouble. A friend of mine, who was troubleman for three exchanges, and lived ten miles from my home, asked me to take a case of trouble for him. I promised to try it. A doctor had reported something wrong with his telephone. When I arrived at his house the doctor's wife asked me why they could hear people talking when the receiver was on the hook. As I had just read up on hook switches I had an idea that I knew what was wrong. I opened up the telephone, and sure enough, the hook switch did not break the contact in the secondary circuit, but left the receiver cut in circuit all the time and caused that spooky sound of voices coming from a receiver which is supposed to be shut off.

Did I feel puffed up when I succeeded in adjusting this trouble? Well, there is only one thing that will approach the feeling which a young troubleman gets when he has found his first case of trouble. That is a young rooster when he has discovered that he can crow. I have seen that same chesty bearing in quite a number of young troublemen since, after they had succeeded in locating their first case of trouble. The fact is, it puts any man in good humor to clear up a case of trouble, especially if it has been a stubborn one to locate.

My next attempt as a troubleman did not result so well for me. Shortly after my first experience my friend asked me to go to a drug store and see why the telephone bell would not ring. I looked the place over, examined the bell, wiring, ground rod and all, but could find nothing which looked wrong to me, so I had to give it up.

The next day the troubleman drove over, and we both went back to find out what the trouble was. This man looked over the ringer and said "O. K." Then he went outside to examine the ground connection. This had looked all right to me, but my friend grabbed the ground rod and easily pulled it out of the ground. It was a 12-inch bolt. It was winter time, and I had not learned that frost would interfere with the ground connection. The temporary ground rod was too short to reach moisture.

My First Job as Troubleman.

Shortly after this I secured my first job as a real troubleman. With my limited experience I felt a little shaky about being able to handle the trouble work of this country exchange, as there was no man on the job to help me out if I got stuck. The man I was to succeed had only half a day to stay on the job after I started to work. That afternoon we went out on a long country line which had a short in the circuit. After quite a bit of driving and testing, we finally located the cross in the wires, about dark on a winter night.

The big lineman went up a pole, shook out the cross, and dropped down again in about three steps. The next morning the same line was reported out of order again. I went out alone, and succeeded in finding the short in the same span where we had found our trouble the evening before. The lineman had been in such a hurry that he failed to see that he had swung a cross into the line again while climbing down off the pole. That experience gave me an opinion which many later experiences have strengthened, that a troubleman has not finished his work when the trouble is cleared. He must leave conditions so that the same kind of trouble cannot again occur at that place.

The Importance of Little Things.

A telephone troubleman soon learns the importance of little things. As an illustration, I will tell you how much trouble was caused by a little spring, about half an inch long, getting out of adjustment. One day in March, when the mud was deep, a farmer complained that he could not ring central. I made the long drive out to his place, and found that the generator in his telephone would not generate, and I could not tell why. I took the generator out and drove back to town with it. On Main Street I met the troubleman whose place I had taken and he stopped to talk. I showed him the generator and told him I could not find the trouble with it. He took off a little spring, bent it slightly, put it back in place, and the generator was O. K. The next day I went back to the farmer's house and replaced the generator. The trip took five hours. It is hardly necessary to state that I never had to make two trips for that same sort of trouble again.

A few years' experience in trouble work is a great educator for a troubleman. I remained on this country exchange for several years, helping build most of the lines. I knew most of the subscribers by their first names, and knew just about every wrinkle of the whole exchange. When a man learns his lines well and can use a test set intelligently, he can get a case of trouble the first time, almost without fail. And that is the real test of a troubleman, to find the trouble and repair it so that it will stay fixed the first time he covers a line. When a man has to go out two or three times on a case of trouble, or has the same trouble coming back after he has worked on it, he is not a real troubleman.

However, it is not the easiest thing in the world to get the trouble the first time on a long and heavily loaded country line, especially one that has numerous long branch lines tapped on to it. The most aggravating trouble to locate on a line of this kind is a ground. I have driven many miles, climbing, testing and cussing, to locate grounds on telephone instruments caused by people laying coins, oil cans, metal combs, hair pins, button hooks and all sorts of jewelry on the top of the telephone. People consciously or unconsciously, cause troublemen a great deal of work. I have found trouble caused by coats and heavy telephone directories hanging on the crank of a magneto telephone and many times I have found trouble caused by the receiver of a desk stand being held up by a pile of books or papers.

One party left the desk telephone on the window sill with the window open, when a sudden shower soaked the cord and put trouble on the line. Another family had a pet monkey which chewed the cord of the telephone until he put the line out of service.

Mischievous boys sometimes cause trouble on telephone lines. One boy fastened a tin can to a line with a piece

of wire, and listened in the can to see if he could hear anybody talking. No one, of course, was talking on that line, as he had put the line out of order with his short piece of wire.

Trouble Causes Friction Between Companies.

Another similar case of trouble, where boys had interfered with a line, caused a great deal of friction between two telephone companies. At that time I was both wire chief and troubleman for a small telephone company. We had five toll circuits connecting with a telephone company in a nearby city. We maintained the circuits to the limits of the larger city. The custom was, when trouble showed on the toll circuits, for the city exchange to send out a lineman to the test pole at the city limits, and if the trouble showed beyond the city limits, we were notified and covered the line from our end.

On this occasion we had been having considerable trouble with one of our circuits, which showed a high resistance short, which seemed to clear up on bright days, only to come back in damp weather. The manager of our company went away for several days and left me in charge, with instructions to get this toll line working. I asked the other office to get another test on this trouble, which they did, and as usual reported "O. K." from their office to the test pole. I went over this line again and tested from the test pole to our office and found the line O. K., making my test with a magneto test set.

The next morning the trouble was on again. I decided to report this case to the manager of the city exchange, as I was positive the trouble was on that end. I asked him if he could get some action in his trouble department; I told him there had been trouble on a toll circuit most of the time for a month.

Well, the request certainly resulted in action. It seemed that there was an official in the company, who was responsible for the work of the trouble department but of whose existence I did not know. He was called the superintendent of equipment. He took offense at my reporting this case to the manager, instead of reporting it to him. Shortly after I had talked to the manager, he called me up—and called me down! He told me that I could tell *absolutely nothing* by a test with a magneto test set—and I had been shooting trouble for ten years and testing with nothing else! He also said that he had stood beside his wire chief on the last test on this line and knew what he was talking about; and furthermore, he would send a lineman out to the test pole and get another test, and then leave the line open at the test pole until I got the trouble cleared up.

Well, he had me "buffaloed." I began to think I might be wrong and that the trouble might be on my division. It was not long until their wire chief was testing with our operator and the line was O. K. This time it stayed O. K. In talking with the wire chief a few days later, I asked where the trouble was located. He told me that the troubleman found a piece of fine wire wrapped loosely around the line wires of the circuit, on their side of the test pole. On wet days this caused a short, but when it was dry, the resistance was so high as not to interrupt service. An explanation was due from the superintendent of equipment, but I heard nothing from him.

Sometimes the elements are against a troubleman and interfere seriously with his work. About five o'clock one summer evening, I was called out on a case of trouble on a toll line 160 miles long. One wire was open. I went out in an open machine, got a test where I struck the line, and was instructed by the wire chief to cover the line about six miles east. The road was muddy and it soon started in to rain hard. We could not travel very fast and it was getting so dark that I was just about ready to give it up and turn back, when I discovered a broken wire. By this time we were having a terrible storm, with lightning flashing constantly. I would not give up at this stage of the game, so I got out my tools and started to splice the wire. I could find nothing to stand on to keep me free from the ground, so the tools were knocked out of my hands by the lightning several times before I succeeded in making a splice. By the time I got the wire up on the pole, the cord of my test set was wet and I could not call in to report to the wire chief.

It happened that there was another break in the same wire about six spans farther on, so my trip in the storm was of no avail, as another trip was necessary the next day to get the line working.

Trouble Caused by High Tension Line.

The most disastrous case of trouble which I have encountered was caused by a high tension line. A wire on a 30,000-volt lead dropped down on the primary of the lighting circuit in our city, and got through somewhere into the telephone circuits. Fortunately, not many coils were burned out, but I had to replace about 200 condensers, which gave me a steady job for two weeks.

It is an easy matter to locate a shorted condenser in a two-party line, with one instrument on each side of the circuit, but it is not so easy when there are several instruments on each side. In this case, where a shorted condenser was on the dry side of the line, the line would not ring grounded from the switchboard, and it was necessary to use the voltmeter to locate the bad condensers. As I was both wire chief and troubleman, it was necessary to call on the chief operator for assistance in testing. She soon learned to use the voltmeter like a wire chief.

There is one class of telephone trouble which we all dread, and that is intermittent trouble. When the trouble clears up before it is located and keeps showing up again every few days, it "gets my goat," as one lineman expressed it. I remember a mysterious case of this kind, where one side of a ten-party country line went grounded for a while every day or two. Just about the time we would get the trouble cornered, it would disappear.

Troublemen were sent out on this case at least a dozen times, but every time, like a flea, it disappeared just before it was caught. Finally after a telephone instrument was replaced by another, the trouble cleared up. A close examination of this instrument disclosed the fact that the short curls or coils of wire from the bell coils, were of such shape that when the door of the instrument was closed one curl touched a spring of the switch hook frame. Changes of temperature or the jar of the instrument caused a ground here part of the time.

A great deal of a troubleman's time is spent on the road in getting to the place where his trouble is located. I once drove 44 miles to do 15 minutes' work. This was a case of switchboard trouble. On one position of the board the ringing power was on the operator's talking circuit all the time. The local troubleman could not find the trouble, so I was sent out on a 22-mile drive to help him out. When I got there I soon found a broken cam spring which was causing the trouble, and it was only the work of a few minutes to replace the spring with a new one and I was ready for my long drive home again.

Fascination in Shooting Trouble.

There is a kind of fascination in pursuing a case of trouble, which makes the work of a troubleman interesting. Of course, a great deal of the fascination wears off after years of this kind of work, and it is then nothing but work. Shooting trouble is not an easy job. A man must use his wits all the time; he must be right on the

job to go out after trouble and get it the first time without going over the line more than once.

We all seem to get careless at times and pass up places where we think we ought to test, only to find we have to come back. My experience has been that when a man goes out on a case of trouble, he should make tests and be absolutely sure, all the time, that he has not passed the trouble. Much time is lost in taking chances that the trouble is ahead, without making sure. On the other hand, a man may take too much time and make unnecessary tests. I once knew a troubleman to get out on a grounded line, and after testing at the terminal pole, where the open wire started, to take his set of blocks and cut the wire to test, in three places in three-fourths of a mile, where there was a perfectly clear line, no trees, no guys, and no drops. That man was not a born trouble shooter, and he evidently had not acquired ability in that line.

Trouble work is much easier when a troubleman works under a good trouble tester at a test board. But after all, a troubleman's success depends on his own ability, whether he is working on a makeshift rural line, without even a test set, or whether he is on a modern city exchange, working under high pressure, with a wire chief to direct all his movements and test each circuit on which he works.

Meeting of Southern Indiana Independents.

The Southern Indiana Independent Telephone Owners' Association held a most successful meeting at Washington, Ind., on August 22. The address of welcome was made by Mayor John W. McCarthy and the response by M. F. Hosea, traffic manager of the Indianapolis Telephone Co. A member of the Indiana Public Service Commission was present and addressed the convention on "Commission Problems."

Luncheon was served by the Rebekah Sisters at the I. O. O. F. Temple to the members of the association and their guests—a total over 200 people.

After an automobile tour over the city, the assembly was called to order for the afternoon session. Prof. R. V. Achatz, instructor in telephone engineering at Purdue University, Lafayette, Ind., then delivered an address on "Economical Construction and Transmission." After a discussion on "Telephone Subscribers," led by S. M. Isom, of Mitchell, Ind., the remainder of the afternoon session was given over to round table talks.

Since the installation of a new automatic system the Pike County Telephone Co. has been and is experiencing a rapid increase in business in Washington, Ind. The service was highly complimented by the Washington business men present at the convention.

Much credit was given C. R. Head general manager of the Pike County company, for the success of this meeting. The next meeting of the association will be held at Huntingburg, Ind., on November 21. Following is a list of those in attendance at the Washington meeting:

O. Tipton, R. Smith, W. Lucas, Geo. McMahan, G. K. Haspel, J. W. McCarty, P. A. Zulanf, Geo. Green, Z. Mortan, E. O. Jones, L. Hasketts, J. A. Colbert, the Misses L. Peck, E. Clements, L. Denny, T. Kidwell, L. Dunbar and M. Lucas, and the Mesdames T. Gharst, A. C. Flagg, H. L. Lockman, C. C. Martin and R. E. Granthaw, all of Washington.

M. McO. Stoops, H. R. Miller, J. W. Coleman, F. J. Burger, Mr. and Mrs. Frank Thomas, C. H. Carlisle, S. H. Mosker, O. A. Byers, W. D. Curll, N. B. Coffman, Clint Whiteman, W. A. Fleeming, J. O'Brien, W. E. Davisson, Frank Jean, Clay Lowman, all of Petersburg.

E. J. Landgrader and Henry Landgrader, of Huntington; D. E. Layfor, G. M. Greene and A. E. Leonard, of Velpen; L. E. Plummer and Edwin Plummer, of French Lick; O. K. Cats and J. M. Goldman, of Monroe City; E. D. Miller and F. M. Miller, of Edwardsport; F. G. Meyer, of Vincennes, Ind.; H. H. Noe, S. S. Weaver and A. W. Coffman, of Wheatland; Mr. and Mrs. F. R. Parrett, of Princeton; E. W. Alexander, of Oakland City; Samuel Hargrove, of Union; A. T. Ackerman and Isom Ackerman, of Loogootee; E. P. Schafer, H. W. Hogue, H. A. Raluston and M. F. Hosea, of Indianapolis.

C. B. Strange, of Plainfield; J. J. Hinsel, of Jasper, O. Susott, of Elberfeld; J. C. Flint, Truman Flint, Miss Lulu Hewitt and Mrs. J. C. Flint, of Odon; H. E. Craig, of Otwell; F. A. Ragsdale and P. Dille, of Glendale; H. C. Rothest, of Huntingburg; C. C. Daugherty, of Evansville; Miss Blanche Thompson, of Montgomery; Mrs. Rose Huddle, of Bruceville; C. A. Phillipson and R. S. Torr, of Bicknell; R. V. Achatz, of West Lafayette; L. C. Griffitts, of Seymour, president of the association; J. L. Hosea, of Columbus; E. O. Holly and B. H. Blake, of Chicago; and O. W. Block and C. G. Flatt, of St. Louis.

Those in Attendance at a Recent Meeting of the Southern Indiana Independent Telephone Owners' Association.

Fundamental Principles of the Telephone Business

A Reading Course Designed to Present Logically the Principles Which Underlie Successful Organization and Operation of Telephone Properties—Prepared Under the General Supervision of Stanley R. Edwards—Part I, Telephone Economics, by James H. Shoemaker, Completed June 26, 1915—Part II, The Corporate Telephone Organization, by J. C. Kelsey and S. R. Edwards, Completed September 25, 1915—Part III, Telephone Accounting and Auditing, by James H. Shoemaker, Completed January 15, 1916—Part IV, Telephone Finance, by J. C. Kelsey and S. R. Edwards, Completed June 3, 1916—Installments Now Being Presented Comprise Part V, Telephone Advertising and Publicity, Written by Roy D. Mock

Quiz Questions on the Preceding Installment.

54. What subject in the handling of advertisements is of unusually vital importance? State how it is frequently disregarded.

55. Discuss the two examples given in Figs. 44 and 45 as regards fusion.

56. Illustrate positive and negative forms of telephone advertisements.

57. What is meant by telling a definite story in telephone advertising?

CHAPTER V. Practical Advertising Psychology (Concl'd).

58. *Specific Appeal in An Advertisement.*—The main part of a cigar advertisement is reproduced in Fig. 50. Fig. 51 shows how, with the change of a very few words, this same advertisement can be made to advertise shoes. This advertisement would apply just as well for advertising flour, clothing, automobiles, or sausage. It would be equally weak with any of them. Such advertisements which lack specific appeals have a very meager relationship with the article advertised.

On the other hand, observe that Fig. 52 is specific. The entire advertisement including the illustration would have to be changed in order to make it apply to any other kind of product.

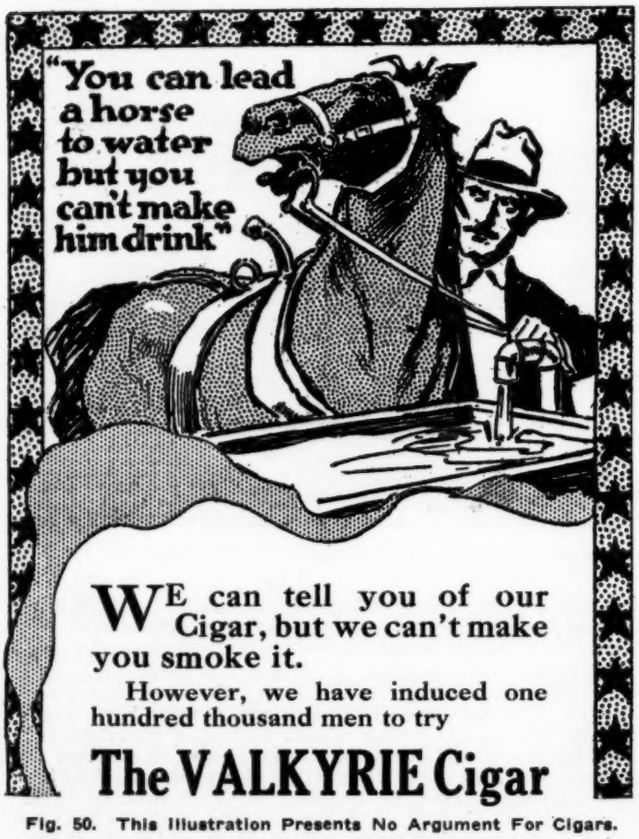

"You can lead a horse to water but you can't make him drink"
WE can tell you of our Cigar, but we can't make you smoke it.
However, we have induced one hundred thousand men to try
The VALKYRIE Cigar

Fig. 50. This Illustration Presents No Argument For Cigars.

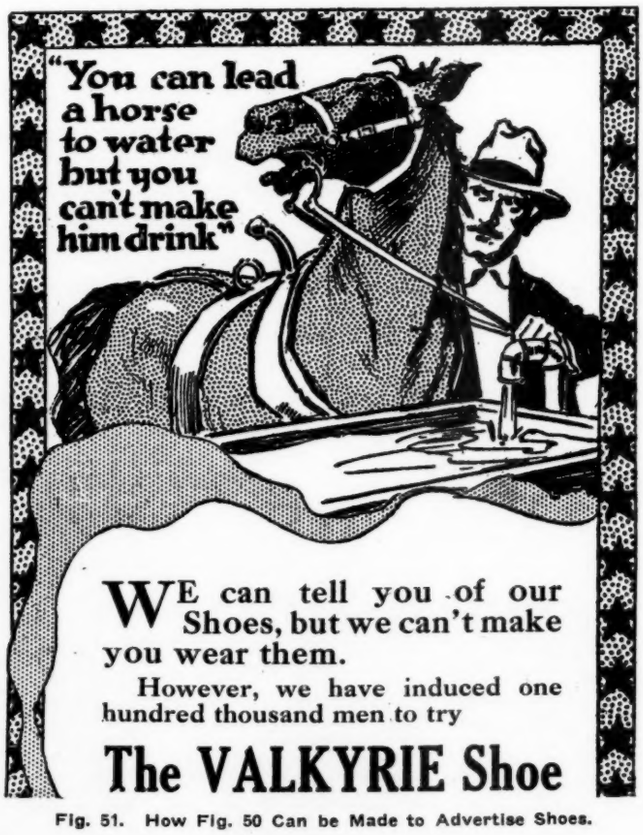

"You can lead a horse to water but you can't make him drink"
WE can tell you of our Shoes, but we can't make you wear them.
However, we have induced one hundred thousand men to try
The VALKYRIE Shoe

Fig. 51. How Fig. 50 Can be Made to Advertise Shoes.

In the cigar advertisement (Fig. 50) it would have been very easy to secure an illustration which would be applicable to cigars and to cigars only, whereas a stubborn horse has nothing whatever to do with the pleasures of smoking. The advertisement reproduced in Fig. 53 is specific in meaning but not in form, since the words "Home Telephone Co." could be substituted for the name of the Bell company and the story would still read logically.

This criticism would not necessarily hurt the pulling power

of this particular advertisement since it appeared in a Chicago newspaper which reaches only territory covered thoroughly by the Chicago Telephone Co. If an advertisement of this type, however, were run in a community where the Independent and the Bell companies were in active competition, the ap-

They die outdoors!
RATS spoil your grain — kill your chicks — cost you much money — cut down your profits. Just crumble up a
Rat Bis-Kit
where they run. Rats seek it, eat it and die outdoors. Easiest, quickest, cleanest way. Price 25 and 15 cents at all drug and general stores or direct from us.
The Rat Biscuit Company, Springfield, Ohio.
For roaches and water bugs use Rat Bis-Kit Paste --the new Poison in the tube--25c.

Fig. 52. Extremely Specific—This Could Advertise Nothing But Rat Poison.

pearance of this advertisement would benefit one company about as much as the other.

CHAPTER VI. Criterions of Telephone Advertising.

59. *Purpose of Criterions for Telephone Advertising.*—In order that the telephone man may be able to test telephone advertising we have devised eight criterions. It is not the purpose of these criterions to serve as a guide to the writing of advertising, but rather to the testing of the finished product. If every telephone advertisement, before being sent to the printer or publisher, were to be tested by these eight rules, it is certain that better telephone advertising would result.

60. *The First Criterion.*—The first criterion to be applied to a telephone advertisement may be stated in the form of the question: Will this advertisement appeal to the largest possible number of readers in the community?

A very interesting advertisement might be written on the construction of a telephone receiver; that is, it would be interesting to perhaps half a dozen people in the community. But as it would be of interest to so few, it would not be worth while to publish such an advertisement.

In order to get the full value from his advertising expenditure, every telephone manager should see to it that the advertisements put out have a broad appeal. This requires the application of a great fund of common sense as well as the ability to pick out the fundamental selling points in a proposition. It is not enough to submit an advertisement to one's friends for their decision or advice regarding it, for they are quite likely to be biased in their judgment.

Any telephone business is a mine of valuable material concerning which powerful advertisements can be written for years and years.

Remember this first criterion—make each advertisement broad enough in its appeal so that it will influence the greatest possible number of readers.

61. *Specific Appeal, the Second Criterion.*—Every advertisement should be so specific that it will bring business only to the concern which is paying the bills. This criterion of specific appeal will serve as a check on the first criterion which advises that an advertisement should be made broad in its appeal.

An advertisement should be made broad in its appeal to the general public, but narrow in regard to the story it tells. If it does not tell a story of some one telephone company or of some one telephone service, it will probably be of as much help to competitors as to the company paying the bill. Many Independent telephone companies have competition—competition of the hardest kind to deal with. Before the manager of such an Independent company sends any piece of advertising copy to the printer or publisher, he should submit it to this test:

Substitute the name of the competing Bell company for the name of his company which is about to issue the advertisement. If the advertisement seems just as effective—if it reads just as smoothly and, apparently, as logically—then the advertisement is weak and should be re-written so it has an individuality all its own.

The advertisement should give definite reasons why Independent service is preferable to Bell service. It should focus attention on Independent telephony rather than on the telephone business in general.

To produce such an advertisement often requires a great

Telephones $68,000 Order
THE agent for a well known automobile manufacturer, recently placed an order for cars amounting to $68,000 by Long Distance telephone.
There is an ever-increasing number of business men who use the Long Distance service of the Bell System in buying and selling.
Bell lines extend to all parts of the country, reaching 70,000 places and giving unlimited opportunities for the expansion of business.
Every Bell Telephone is a Long Distance Telephone
Chicago Telephone Company
Bell Telephone Building
Official 100

Fig. 53. Specific in Meaning—Not So Specific in Form.

deal of time and thought. But if advertising is worth anything at all, it is well worth this time and thought.

The second criterion then is this: Is this advertisement specific? Does it tell a story regarding this one company only?

(To be Continued.)

Principles of Receiver Design and Practical Limitations

Discussion of the Mechanical and Electrical Properties of Telephone Receivers—The Proportioning of the Magnetic Circuit to Secure Maximum Efficiency—Distortion and Methods of Reducing It to a Minimum

By E. W. Kellogg

A receiver must be capable of rendering the high frequency currents that reach the end of the line, into articulate speech sounds of good volume and the maximum possible clearness.

Requirements of Receivers.

Since the currents received depend on the length and kind of line and many other factors, the duty imposed on the receiver, of rendering them into distinct speech, is a rather variable one. A receiver which works best at the end of one line might not necessarily be the best for another line. Greater sensitiveness on the part of the receiver to currents of one frequency than to currents of other frequencies can conceivably be an actual advantage, provided the frequencies to which the receiver is especially sensitive are those which are weakened most in transmission. Since this compensating distortion is not usually realized in any considerable degree in practice, it may be stated as a general rule that the less distortion produced by the receiver, the better.

Loudness is an advantage only up to a certain point. If a receiver gives enough volume of sound to be easily heard, any added loudness is of slight advantage. Receivers for use on short lines only, are therefore not necessarily designed with a view to maximum sensitiveness. On long distance connections, on the other hand, the problem is to get a sufficient volume of sound from the extremely feeble currents which reach the receiver, and the more sensitive the receiver the better. Since exchange stations must be equipped with a view to their possible use in long distance conversations, receivers for exchange use should be as sensitive as they can be made, or in other words, should transform as much of the electrical energy into sound waves as possible.

The best receiver for a given purpose is the one which is found by trial to talk the best. But on the principle that maximum loudness and minimum distortion are the conditions for the best talking, an analysis of the electrical and mechanical characteristics of receivers is instructive and may point the way to the correction of difficulties.

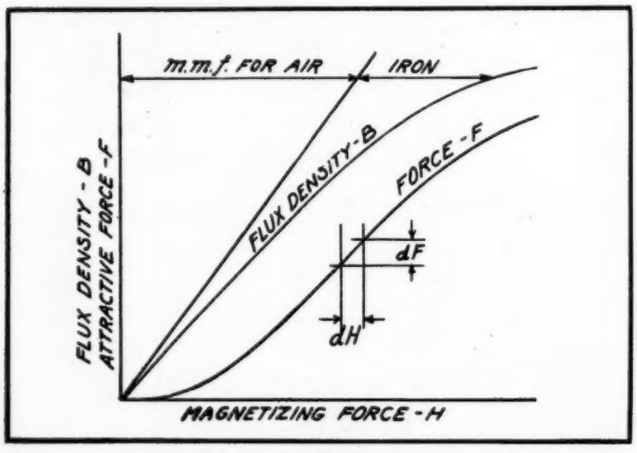


Fig. 1. Relation Between M.M.F. and Force on the Diaphragm.

The sound produced by a receiver depends upon the following factors: The strength of the high frequency current through the windings (which is determined, in part, by the resistance and reactance of the windings), the number of turns in the winding; the air gap; the area of the pole tips; the permeability of the iron in the magnetic circuit; the degree of polarization or strength of the permanent magnet; the stiffness and weight of the diaphragm; the size of the diaphragm; and the shape of the air chamber in front of the diaphragm.

Strength of Permanent Magnet.

For a given frequency and a diaphragm of given weight and stiffness, the amplitude of vibration will be proportional to the difference between the maximum and minimum pulls exerted by the magnet. The maximum pull occurs when the current in the winding assists the permanent magnetism; the minimum pull when the winding current exerts a demagnetizing force.

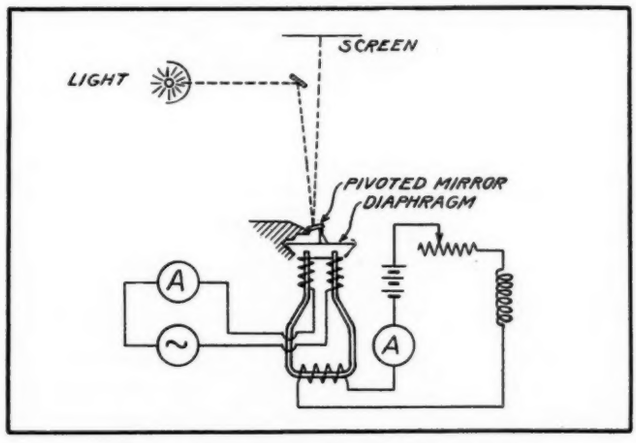


Fig. 3. Arrangement for Polarization Test.

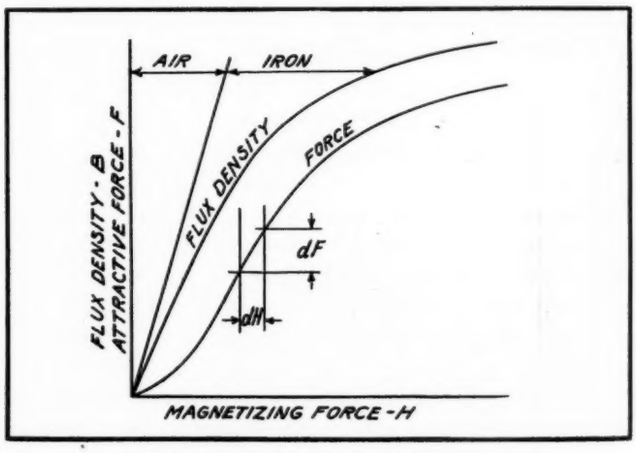


Fig. 2. Effect of Decreased Air Gap.

The permanent magnet supplies a practically constant magnetizing force and the winding supplies a small magnetomotive force which alternates in direction.

The pull exerted by a magnet varies directly as the area of the pole tips, multiplied by the square of the flux density. Force $=F=K\times A\times B^2$, in which K is a constant, A the area of the pole tips, and B the flux density in the air gap. The constant, $K=1/72{,}200{,}000$, if A is expressed in square inches. B in lines per square inch, and F in pounds.

If B stands for the average flux density, due to the permanent magnet, and b for the increase or decrease in flux density, due to the telephonic current in the winding,
the maximum pull will be $KA(B+b)^2=KA(B^2+2Bb+b^2)$, and the minimum pull will be $KA(B-b)^2=KA(B^2-2Bb+b^2)$.
The difference, or the variation in pull is $dF=KA(4Bb)$.

In other words, the variation in the pull on the diaphragm is

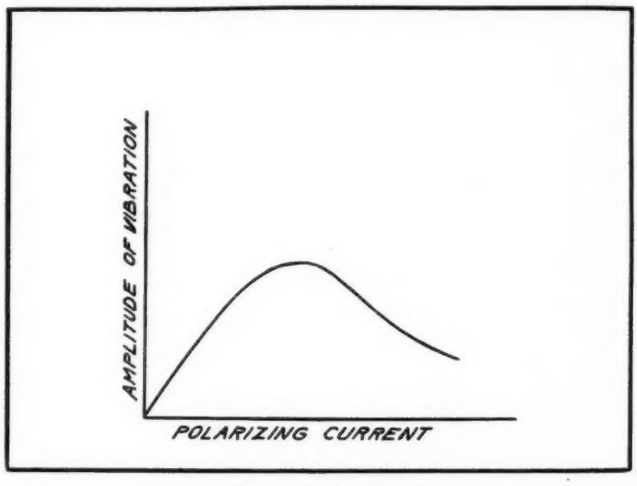


Fig. 4. Effect of Magnet Strength.

proportional to the change in magnetism produced by the telephonic current, multiplied by the average flux density. Hence the stronger the permanent magnet, other things being equal, the more strongly will the diaphragm be actuated.

There is a limit, however, to the magnetic strength which can be employed to advantage. The diaphragm is of very thin iron, and soon becomes saturated. This reduces the changes of magnetism which the winding can produce, and thus throws away more than was gained by increasing the average flux density in the air gap. Fig. 1 gives a typical magnetization curve, and a curve of magnetic pull vs. magnetizing force. The steepness of the curve, F, is a measure of the sensitiveness of the receiver. It is seen that there is certain value of the average magnetizing force of the permanent magnet, at which this curve is steepest, and therefore at which the receiver is

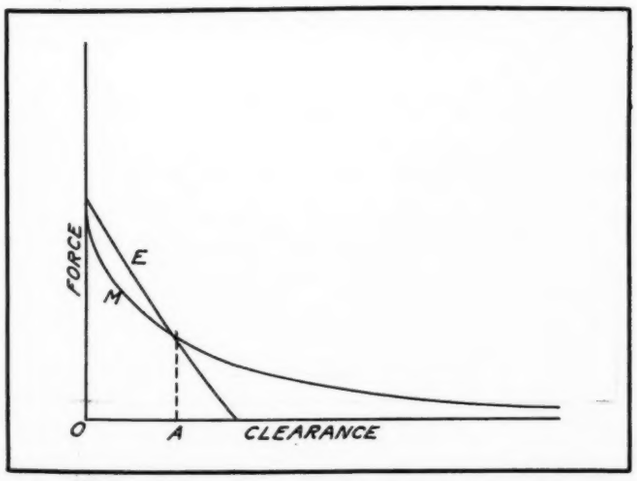


Fig. 5. Clearance to Prevent Diaphragm Adhering to Pole Tips.

most sensitive. This fact may be demonstrated by substituting an electromagnet for the permanent magnet, and varying the degree of polarization by changing the strength of the direct current in the exciting coil of the electromagnet.

An arrangement for a test of this kind is shown in Fig. 3. An alternating current of constant strength and frequency is sent through the windings on the pole tips. It is found that as the polarizing current is increased, the vibrations of the diaphragm increase in amplitude up to a certain point, and then decrease, as shown in Fig. 4.

Area of Pole Tips.

The expression given for variation in pull, ($dF=4KABb$), contains the factor A, indicating that the variations in pull are directly proportional to the pole face area. This would be true, provided the area, A, could be increased without sacrificing the flux density, B. The flux density, B, multiplied by the cross section, A, gives the total flux and this is limited to what the diaphragm can carry without becoming saturated.

It is, therefore, a matter of choice whether to work with low flux density and large pole tips, or the reverse. There is a slight advantage in using small pole tips and high average flux density, since increasing the pole face area increases the inductance of the receiver windings whereas increasing the magnetic density does not.

Length of Air Gap.

The shorter the air gap, the greater the changes in flux density that a given current in the receiver winding can produce and, consequently, the more sensitive the receiver. Fig. 2 shows flux density and force curves for the same magnetic circuit as Fig. 1, except that the air gap is reduced to one-half its former length. It will be noticed that this has nearly doubled the slope of the curve of force vs. m. m. f. In order to realize the benefit of reduced air gap, the magnetizing force of the permanent magnet must be reduced at the same time so as to avoid diaphragm saturation. The steepest part of the force curve in Fig. 2 occurs at the same flux density as that in Fig. 1, but at a lower magnetizing force.

Decreasing the air gap, in that it causes the same current to produce greater change in flux, increases the inductance of the windings. Since, however, a large part of the winding inductance is due to leakage flux rather than working flux, this increase of inductance is not sufficient to be a serious disadvantage or to offset the gain resulting from reduced air gap.

The minimum length of air gap that may be used, is fixed by the stability of the diaphragm and the amplitude of its vibrations.

The average clearance must be such that the diaphragm will

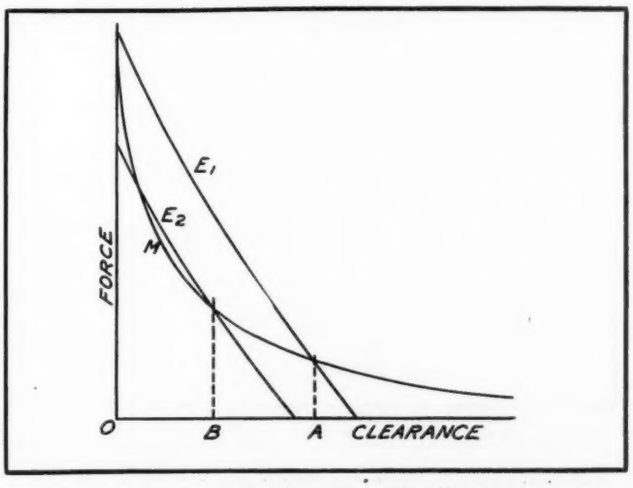


Fig. 6. Reduction in Clearance by Using Weaker Magnet.

never strike the pole tips. Such measurements as have been made seem to indicate that under ordinary service conditions, the swing of the diaphragm never exceeds 0.001 inch in either direction and only rarely reaches that value. Receivers have been built with air gaps as small as 0.001 inch, but owing to the extreme refinement necessary in adjusting the clearance, few manufacturers have attempted to build receivers

with air gaps of less than three or four thousandths of an inch.

One of the difficulties in adjusting the air gap is that of making the correct allowance for deflection of the diaphragm. Unless the magnet strength can be closely standardized, there will be considerable variations in the deflections for different receivers. The manner in which the edges of the diaphragm are clamped also affects the deflection.

The diaphragm must possess sufficient elastic force to prevent its adhering to the pole tips when pushed against them. For a diaphragm of a given stiffness and a magnet of given strength, there is a minimum permissible clearance and, if the clearance is made less than this, the diaphragm is likely to stick to the poles. In Fig. 5 the curve, *M*, gives the relation between magnetic pull and clearance, and the lines, E_1, and E_2, the relation between deflection and elastic force of the diaphragm.

If the diaphragm is set so that the clearance is normally *O, A,* and is pushed against the pole pieces, it will spring away, because the elastic force exceeds the magnetic pull. But if it is set so that the clearance is normally *O, B,* it will adhere to the pole pieces if brought into contact with them, the magnetic pull being in excess of the elastic force when the diaphragm is in contact with the poles. The employment of a weaker magnet permits of reducing the normal clearance as will be seen by comparing Fig. 6 with Fig. 5. This does not mean necessarily working with a lower flux density in the air gap, for the normal pull, which is a measure of flux density, is about the same in Fig. 6 as in Fig. 5.

Receiver Winding Impedance.

When a receiver is connected in a telephone set at the end of a line in the ordinary manner, the current which flows through it as a result of speaking into the distant transmitter, is limited partly by the impedance of the receiver itself and partly by the impedance of the line, plus the remainder of the terminal apparatus.

By winding more turns on the receiver poles, the current will be reduced, but each unit of current will have a greater effect on the diaphragm. In a previous article it was shown to be a general principle in regard to electric circuits, that when an adjustable impedance is connected in series with a fixed impedance, the former will receive the maximum amount of energy if the two are equal. It follows that if the receiver winding consists of such a number of turns that its impedance is equal to the impedance of the remainder of the

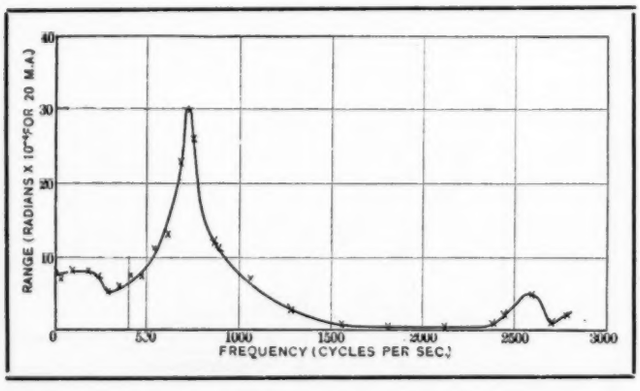


Fig. 7. Sensitiveness of Receiver at Different Frequencies.

telephone set plus that of the line, the receiver will absorb the maximum amount of power.

This would be the most favorable condition for receiving, but such a high impedance would be objectionable from the standpoint of transmitting. The best conditions for transmitting are reached when the effective transmitter resistance is equal to the combined impedance of receiver and line.

"Effective resistance" takes into account the ratio of the induction coil, if a coil is used. For example, if the induction coil in a local battery set has a step-up ratio of 4:1, a 10-ohm transmitter in the low voltage circuit would be equivalent to a resistance of about $4^2 \times 10 = 160$ ohms in the line and receiver circuit, or the "effective resistance" of the transmitter would be 160 ohms when measured on the line side of the coil.

It is obviously impossible to give each instrument an impedance equal to that of the other plus that of the line, and a compromise is necessary. The practice among the Bell companies is to use a telephone set which, as a whole (combined impedance of transmitter, receiver, and induction coil), has an impedance about equal to that of an average line.

As to the choice between sacrificing transmitting efficiency to receiving efficiency or vice versa, there is perhaps some advantage in giving preference to transmitting. To make the receiver more sensitive means the magnifying of all the disturbing noises as well as increasing the loudness of the speech, whereas if the transmitter output can be increased, the speech sounds alone are strengthened.

Shape of Air Chamber.

The partial confinement of the air in front of the receiver diaphragm by the cap results in giving off more sound. The diaphragm can impart energy to the air next it only by compressing and rarefying the air. If the passage by which the air can get away is somewhat constricted, a given movement of the diaphragm can accomplish more in the way of compression or rarefaction than if the diaphragm were in free air.

On the other hand, the compressed air in the chamber must communicate its energy to the air outside before the diaphragm begins its return movement, so the outlet must not be too constricted. The shape and dimensions of the receiver cap have been the subjects of much experiment.

Diaphragm Inertia.

Diaphragm inertia is a cause of distortion in the case of the transmitter, and the same is true of the receiver, which is far more sensitive at some frequencies than others. Fig. 7 shows the results of a test by C. F. Meyers and J. B. Whitehead, described in the Proceedings of the American Institute of Electrical Engineers, June, 1912. An alternating current of 20 milliamperes and of variable frequency was sent through the receiver winding, and the amplitude of the vibration was calculated by the deflection of a beam of light reflected from a small mirror mounted on the diaphragm.

There is seen to be a sharp resonance at about 700 periods per second, while at frequencies above 1,500, the diaphragm movements were extremely small. This curve, however, gives a somewhat exaggerated idea of the distortion, particularly with respect to the weakening of the high frequency waves. The rate of energy radiation from a diaphragm depends upon the maximum velocity of movement rather than the amplitude of vibrations, and the velocity is proportional to the product of amplitude and frequency. Thus the energy given off in the form of sound waves at the higher frequencies is relatively greater than the shape of the curve indicates.

Below the resonance frequency the diaphragm movements are limited, principally, by the stiffness of the diaphragm, while at the higher frequencies, inertia predominates. The ideal receiver, from the standpoint of distortion, would be one in which elasticity controlled the movements throughout and inertia played a negligible part.

This condition could be approached if the diaphragm were made so stiff and yet so light that its resonance frequency would be considerably higher than any of the frequencies necessary in speech transmission. Such a diaphragm would at all times give a deflection proportional to the force acting upon it, and the amplitude of its vibrations for a given current strength would be practically the same for all frequencies within the talking range. The greater radiation of sound

energy for a given amplitude at the high frequencies would be compensated for, in large measure, by the increased inductive reactance of the winding.

Unfortunately, it is difficult to build a receiver of these characteristics without making too great a sacrifice of loudness. The diaphragm must be of iron, and lightness can be secured only at the expense of magnetic capacity. Additional stiffness reduces the amplitude of all diaphragm movements. For ordinary purposes the compromise has been struck with a diaphragm having a resonance frequency between 700 and 800 vibrations per second.

The size of diaphragm that can be used to advantage is limited by inertia. Although a large diaphragm will give off more sound than a small diaphragm, for the same amplitude of movement, increasing the diameter results in greater weight and a more sluggish diaphragm, with a lower resonance frequency, and consequently more distortion.

Michigan Traffic Association Holds Annual Meeting.

The annual meeting of the stockholders of the Michigan Independent Telephone & Traffic Association was held at the association's offices, Grand Rapids, Mich., on Tuesday, August 22. The reports indicated a prosperous condition, there being a very decided increase in the number of messages and amount cleared. During the last year 503,852 messages were cleared, amounting to $172,910.84, an increase of 42,848 or 9.2 per cent. in messages and $15,444.07 or 9.8 per cent. in revenue as compared with last year.

The annual dividend of 6 per cent. was declared and the following officers and directors were elected for the ensuing year: C. E. Tarte, Grand Rapids, president; W. J. Melchers, Owosso, vice-president; F. V. Newman, Grand Rapids, secretary-treasurer, and as directors, W. A. Bahlke, Alma; R. C. Smith, Homer; L. L. Conn, Owosso; Thos. Bromley, Jr., Muskegon; A. E. Wells, Grand Rapids; N. F. Wing, Grass Lake; W. B. Serviss, Saginaw; J. P. Gibbs, Ithaca; C. E. Smith, Grand Rapids; C. G. Fitzsimmons, Reading; A. H. McMillan, Bay City; and G. L. Hall, Dowagiac, Mich. The executive committee consists of the officers named and W. B. Serviss and W. A. Bahlke.

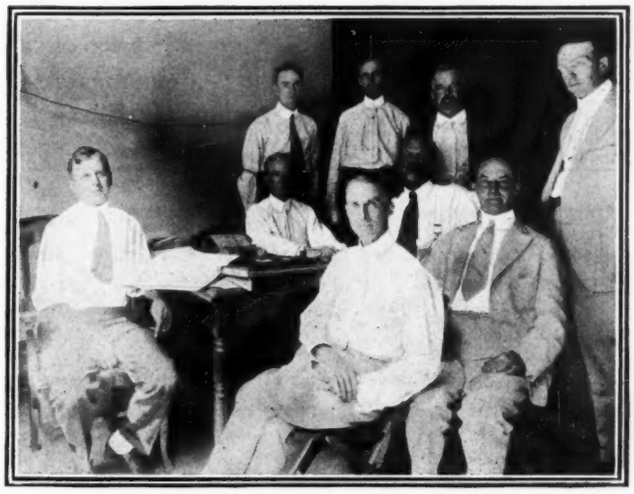
Michigan does not have a regular state organization and the traffic association takes care of the work usually performed by a state association. Its membership is composed of over 37 companies operating in the state of Michigan and the clearing house feature includes business with the Indianapolis Toll Clearing Co. and the Ohio State Telephone Co.

An important department is the service bureau. Miss Bertha V. Stickney has been employed as a traveling instructor during the past year and has visited more than 40 offices and instructions were given to over 500 toll operators. For the coming year a new plan will be introduced of holding schools in various districts for periods of from two to four weeks. This will enable all operators of tributary exchanges to receive instructions, which has not been possible at the one-day schools. By the new method both the regular and relief operators will be able to participate.

The association also has a lantern slide outfit equipped with over 350 slides covering the various rules and other important data in connection with telephone operating. These slides were exhibited at over 20 of the various companies' offices, and are of great assistance in teaching the operators correct operating methods.

Since March 1 the association has employed W. D. Harris, who has had considerable experience in the plant department of the Citizens Telephone Co., of Grand Rapids, to study the question of transmission. He has visited over 37 exchanges, inspecting the apparatus, observing actual conditions of poor leads, cables, etc., and making such recommendations as will materially improve the transmission and facilitate the operating of the long distance business. A service committee has been appointed to co-operate with the various companies in the extension and enlargement of Mr. Harris' work.

During the year the association has printed and mailed out more than 3,000 copies of bulletins containing correc-



Directors of the Michigan Traffic Association.

tions for rate and route books, information pertaining to operating and social items.

The association has been operating for 12 years and the total of business cleared since its organization has been $1,323,663.47. The cost of all work including the clearing service and transmission has been 7 per cent. of the mileage paid to the companies.

Meeting of Eastern Traffic Association and Eastern and Western Pennsylvania State Associations.

The Eastern Traffic Association of Independent Telephone Companies will hold a meeting in Harrisburg on September 5 and 6 for the final adjustment of the toll rate question as regards uniform rates, continuance of night rates and a uniform initial period.

Simultaneously with the meeting of the traffic committee the Western Pennsylvania Independent Telephone Association has decided to hold its 32nd quarterly meeting in Harrisburg. The Eastern Pennsylvania Independent Telephone Association has also issued a call for the holding of its semi-annual meeting at the same time and place, and there will be a joint session of the two associations.

Among the matters to be acted upon will be the adoption of a revised constitution and by-laws by the Western Pennsylvania association and a reorganization of the service committee work covering the entire state, by both associations.

Formation of West Tennessee Independent Association.

Representatives of the various Independent telephone exchanges of West Tennessee met at Union City, Tenn., on August 15, and formed an association to be known as the West Tennessee Independent Telephone Association. The new association is affiliated with the Southern States Independent Telephone Association and will co-operate with that association in its work in West Tennessee.

The following officers were unanimously elected at the meeting: J. H. Todd, Union City, president; J. W. Moore, Trenton, vice-president, and W. R. Gilbert, McKenzie, secretary.

A constitution and by-laws have been adopted, and the association hopes to strengthen the Independent forces in West Tennessee. A board of directors is to be appointed later.

"Telephony's" Home Study Course for Telephone Men

A Complete Presentation of the Principles Underlying Modern Telephony in All Its Branches—Arranged Systematically So That Regular Reading and Faithful Study Will Qualify Ambitious Men for Higher Positions—Prepared Under Supervision of Stanley R. Edwards—This Section Written by Jay G. Mitchell

Quiz Questions on the Preceding Installment.

461. Give an essential quality of the switchboard operator's telephone equipment.

462. What type of transmitter is now standard on large switchboards?

463. Why is the preservation of the exact wave form more important in telephone transmission than it is in ordinary power transmission?

464. What is the principle underlying the common method of rating a given telephone circuit as to its transmission effectiveness?

465. How is accuracy assured in the results obtained?

466. Why are periodical tests of all circuits, especially new ones, most important?

CHAPTER XXI. Telephone Circuit Efficiency (Cont'd).

467. *Standard cable arbitrary as to values.*—The standard cable used in making tests for transmission equivalents is an arbitrary arrangement, having only approximately the actual properties of No. 19 gauge telephone cable. While the resistance of the standard has been established at 88 ohms per mile per pair, the resistance of No. 19 copper wire is about 42.44 ohms per mile or 84.88 ohms per mile per pair. The resistance, on the other hand, of a pair in a No. 19 gauge telephone cable is 94 ohms per mile when the cable is made up according to the most widely used specifications. The extra resistance of the actual wire cable pair is due, as may be readily seen, to the added length incurred by twisting the wires together as the cable is made up.

The capacity of the standard (0.054 mf. per mile) is the same as the capacity of a good telephone cable. An average cable capacity of 0.054 mf. per mile between the two wires of each pair will be shown by a telephone cable in which the capacity per mile of *one* wire, measured against all the others connected together and grounded on the sheath, is 0.08 mf. The value of cable capacity is evidently most important on account of its effect upon the transmission. The meaning of the two methods of measuring capacity, and the relative value of cable rated the same but measured by the two methods, will be taken up in a later section on telephone cables.

468. *Commercial transmission.*—It is proper that a limit should be set beyond which the transmission losses may not go without passing the commercial limit. The original standard required that the transmission from local battery telephones should not be worse than that afforded by a talking circuit through 30 miles of standard cable. The present tendency seems to be in the direction of extending this limit to 35 miles. It is true that many circuits are in operation and paying a profit over which the transmission is inferior to this.

The operating telephone man will do well to keep the losses in the main circuits below 30 miles by maintaining the circuits and apparatus in as good condition as possible. This will be made easier by eliminating inefficient and antiquated equipment, of which the design is not such as to give the greatest transmission effectiveness.

469. *Character of conditions causing losses.*—It is a much more common practice than it should be to blame the outside plant for the greater portion of the transmission losses. In addition to the outside conditions causing losses, others may be found in the most unexpected and commonplace locations. Ill fitting and dirty switchboard plugs, improperly wired protection on toll lines, low impedance bridges across circuits for supervisory purposes and other easily remedied conditions may be made to account for a tremendous aggregate loss in transmission.

In the outside plant one of the most common causes of unduly poor transmission is improperly made wire joints. This particular class of trouble will be instantly eliminated when the linemen make use of the proper wire sleeves in splicing. It is apparent that the matter of maintaining a high standard of transmission effectiveness on all circuits is one of the important elements of successful telephone operating. The expense involved, in comparison with the benefits resulting, is negligible.

470. *The use of unsuitable cable.*—The purchase of aerial and underground cable for use in telephone plants, should always be made with the possible use of the local circuits for toll purposes firmly in mind. Improperly selected telephone cable is one of the most annoying causes of transmission loss. The only saving effected by the purchase of unsuitable cable is found in the first cost of the cable itself, the labor of stringing and connecting being the same for the better grades of the same size. Excellent transmission is one of the most powerful weapons for meeting competition. Toll business is always desirable and is, of course, very sensitive to poor transmission conditions. Other things being equal, it is certain that the plant affording the better long distance facilities will carry more long distance traffic than its competitor.

471. *Devices for reducing transmission losses.*—There are one or two methods by which the transmission losses in telephone circuits may be reduced. One of these, and one of the most common means in use, is the installation of reactance coils in series on the telephone circuit. It will be remembered that the effect of capacity in a circuit carrying alternating currents is to cause one component of the total current in the circuit

to lead the impressed voltage 90 degrees; also that the effect of inductance in a similar circuit is to cause one component of the current in the circuit to lag 90 degrees behind the impressed voltage. (See "Telephony's" Home Study Course for Telephone Men, October 2, 1915, sections 193 and 194, and Fig. 81.)

Now capacity is, to a greater or less extent, unavoidably present in all circuits. It is low for that part of the circuit carried on open wires because the distance between the centers of the

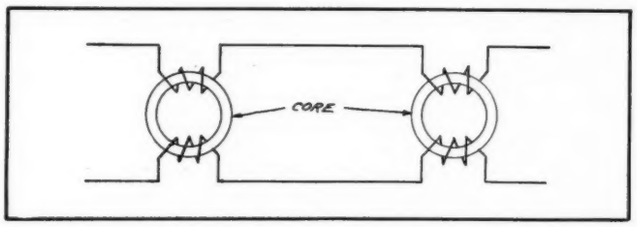


Fig. 164. Insertion of Reactance to Neutralize Effect of Capacity.

wires is considerable. It is greater in that part of the circuit passing through cables because the two wires of each pair in the cable must necessarily be very close together. For any given type of construction, either open wire or cable, the total capacity of a circuit is directly proportional to its length. That is to say, the capacity of 100 miles of open wire metallic circuit having the same spacing throughout its length, is 100 times as great as the capacity of one mile. In the same way, the capacity of 10 miles of No. 19 gauge telephone cable pair is 10 times as much as the capacity of one mile of the same kind of cable pair. In long distance circuits, therefore, the capacity of the circuits becomes relatively high owing to their great length.

It has been shown above that the effect of capacity upon the current in the circuit is exactly the opposite of the effect of the inductance of the circuit upon it. But capacity in the telephone circuit is inherent and may not be eliminated. Therefore, as was pointed out by Oliver Heaviside, if the inductance of the telephone circuit should be readjusted so that the inductance reactance would equal, at all frequencies, the capacity reactance, the transmission over such a circuit would be tremendously improved.

It is evidently a practical impossibility to design reactance coils that will fulfil this condition at *all frequencies* but Prof. Michael Idvorsky Pupin has worked out the proposition so that coils may be installed that are effective at the principal frequencies. The reduction in transmission loss for any long-haul circuit properly equipped with the Pupin coils, is an important factor in making telephonic communication possible over extremely long distances. The principle which is employed in the use of the Pupin coil is shown in Fig. 164. Two of the series reactance coils used are shown inserted in the two wires of the telephone circuit.

472. *Continuous conductor loading.*—Telephone circuits equipped with the Pupin reactance coils are technically known as loaded circuits. There is another method of loading the circuits in cables that differs radically from the use of reactance coils, although the underlying principle is exactly the same. In some submarine cables, and to a limited extent in other cables, the Krarup method of continuous loading is used. In making an application of this method, each copper wire of the telephone circuits is wrapped with a very small *iron* wire from end to end. In one submarine cable that was particularly successful, the iron wire wrapped around the copper conductors was 0.012 of an inch in diameter and was spaced so that there were 70 complete turns to the inch.

The use of an *iron* wire around the copper conductor of such a cable increases the *magnetic* premeability of the *space* around the wire and *therefore its inductance reactance.* The advantages claimed for this method in submarine cable installations, is that there is less likelihood of faults appearing when the cable is uniformly wrapped than there is when it is necessary to make special sections in order to splice in the Pupin coils. On land lines the same advantage cannot be claimed for the Krarup method of loading.

(To be Continued.)

September Again

A Wonderful Decision—Test of Economic Fitness

By J. C. Kelsey

A Minnesota town needed telephone service—it could not get it because at that time telephone service was confined to large cities—so a group of men got together and organized a local telephone company.

A few of the most courageous ones used the service until the community was fully converted to the telephone. Lines reached out to farmers and telephone service became a most natural attribute of the locality.

Back in 1898, we knew less than we do now. At that time the Bell company was a great bogie man, and was eternally peeking around and saying "Boo!" to every telephone man.

It was a most natural thing that these local telephone men of this little city preferred to sell out rather than to endure the stings of possible competition with the great telephone father at Boston.

So the destiny of telephone service at Austin, Minn., passed into the hands of the Bell licensee.

At this very hour, a great economic blunder was committed which has taken 13 years to be realized.

As soon as the Bell licensee took hold of telephone service at Austin, there was a change, naturally. The Bell management could see no reason whatever for Austin business men getting free service to outlying rural communities, and stopped the privilege.

Just as in the western city, which last week's TELEPHONY described, the pleasure of the citizens changed to sorrow and displeasure by a change of ownership, and hostilities began at once. Had the local company been allowed to flourish, years of trouble and expense would have been avoided.

In 1903, the citizens of Austin organized an Independent telephone company suited to their needs and soon had a subscription list which passed the magic thousand, of which the most enthusiastic man never dreamed.

The Bell company, after purchasing the local plant, had managed to serve 325 subscribers. The 325 subscribers, meeting the wave of competition, wavered, and but 125 of them retained the Bell telephone. They alleged that they needed the long distance service, and were it not for that, they would have abandoned Bell service entirely.

Then the Bell company put in a telephone system which, of course, made a great improvement in service possibilities. But in spite of its beautiful plant, it got no new business except the clientele which the new company rejected on account of non-payment of bills.

So the Bell people practically gave telephone service away to business men, merely to have a toll terminal at their business houses, and furnished residence service as low as $6 per year. It is not known exactly whether the business telephone earned that $6 or the residence station, but the fact remains that both business and residence telephone service were sold at a loss.

The Independent telephone company naturally charged unfair competition, and carried its case to the state railroad and warehouse commission. The commission ruled "that cut-throat telephone rates intended to destroy competition, and common residence and business telephone rates lower than the separate rates for the respective service are unlawful."

And it is to the credit of the commission of Minnesota that it gave heed to this untolerable situation, and granted the prayed-for relief.

A decision of this kind is beneficial to both parties: The local Independent telephone company undoubtedly felt the pressure of such competition, for public memory is short anyway.

The Bell company undoubtedly felt the pressure of such competition in its treasury, and knew, even if it won out, and became master of the local situation, it would undo the work of years by a restoration of rates.

The commission saved both companies from disaster, and particularly the Bell company.

It is a strange thing that men refuse to learn from experience. We know now that there are some cities which are naturally Independent and all the Bell money spent would not change the situation, while there are, likewise, localities where the Bell company cannot be budged by any known artifice.

Some localities will stick to the local Independent exchange, with rusty iron lines, and tottering poles, while the Bell exchange switchboard lamps rarely brighten except to call a toll operator.

The Bell company tried to make an example of Johnstown, Pa. It put into play every device known to clever advertising men, it sent up balloons, used new dollar bills, and after spending a great part of a million dollars had to retreat and lick its sores.

Independents invaded St. Joseph, Mo., and spent nearly two million dollars before they realized that all the expenditure of money and devices would avail them nothing. Independents invaded Jackson, Miss., only to find a Bell stone wall, and no hope of progress or profit. And I could go on, naming localities which favor each side.

The blunder at Austin began when the local company sold out to the Bell company. It is not my purpose to show how accurate hindsight is, because we all know after things have happened what has happened. But if the local company had been encouraged to stay in the telephone business, all the years of waste of time and money would have been saved.

It surely demonstrates the danger to natural monopolists in buying out the successful local Independent company and dispensing with local services.

Our great problem is not altogether the competitive condition. The greatest damage to Independent telephone interests today is the purchase of local plants which have no competitor.

In many communities today Independent properties are being sold, apparently to Independent telephone men. Yet the weakness of this method is the elimination of the local factors, as well as the possibility of absorption on the part of the Bell licensee.

No one will really profit by this continual absorption of the local plant which has no competition.

The purchaser of a local property always has some design. He may not necessarily be a Bell agent nor a philanthropist, but he is going to do something to the locality which the local owners dared not to do. In fact, he has to.

He may abolish free service, raise rates, or change some ancient usage and is bound to come to conflict.

Let well enough alone is not always a good doctrine, but it sometimes works well in the telephone business.

The decision in the Austin case is but an echo of the demand of the human race for fair play.

There was a time when a man could be cast into a dungeon, private or public, and never have hope of a hearing. But as the years have gone by, men have eliminated the unequalities of personal liberty—one can't even be placed in jail for debt. Men are no longer hanged for stealing a loaf of bread, simply because the public has learned to make punishment fit the crime.

The demand for liberty has gone beyond the individual. It goes into corporations and big business.

For years public opinion frowned upon the burning of competitors on public squares, but it could not help itself. Independent telephony was the public's answer to the burning of switchboards. For years the public knew that competitors were being destroyed by all varieties of methods, but could do nothing to stop it.

But the idea of fair competition kept growing, until it is now on our statute books and a commission has been appointed to take cognizance of such conditions.

The demand for fair play has crept into the telephone business, not only in its operating phases, but manufacturing as well. Men have known for years that the billion-dollar Bell company was using its hundred-million-dollar factory for malicious purposes which had no basis of fair play.

We have seen bankers' telegrams used to intimidate the local banker on the board of directors of the telephone company, and we have known of countless other pressures brought to bear, which the small Independent dealer could not hope to use.

Free service at Austin is in the same class with a switchboard sold at cost by the Bell factory.

Free service at Austin is in the same class which promises a Bell connection to an Independent telephone company that buys a Bell factory switchboard.

Free service at Austin is in the same class with a railroad which favors certain shippers and refuses to deliver cars to others.

Free service at Austin compares favorably with every questionable method ever used by predatory corporations.

The world has seen a decided advance since this condition has been remedied. Austin will be one of our landmarks.

The telephone business will never come into its very own until every telephone pays its just charge for service. If every telephone paid its just share, telephone rates would never have to be raised anywhere.

No public utility commission should move one step toward increasing a rate until it finds out who is getting service at too low a cost or for nothing at all. The willing payer has been paying long enough, and the unwilling payer should finally come to his Waterloo.

The most valuable lesson the telephone industry can learn is the realization of the folly of doing the impossible. It has been tried so often and has never yet failed to run time to form.

King Canute tried it on the tide. Napoleon tried it on Europe, and the world at war is now realizing that there are some things which cannot be done at all.

The Bell company has bought out plant after plant in communities which were once happy. It has hurled its factory into the fray, only to find itself confused by the clatter as well as the clutter of ten years' effort. Some things can't be done.

The ideal company to give telephone service in such growing cities as New York, Chicago and Detroit is the Bell parent company, because of its great financial ability. It can concentrate its millions at any one spot and no one can reasonably find fault with that.

But the ideal company to give telephone service in lesser communties (with few exceptions) is one locally owned and directed. And no one should encourage this tendency more than the Bell financial interests themselves, if they care to give the telephone business full rein.

No Independent dreams of New York, Chicago or Detroit, and no Bell brain should dream of Austin, Pasco, Webster City, Storm Lake and kindred places.

The beauty of the Austin decision is that both sides win.

The locals win because they have no absurd and wasteful handicap further to worry them.

The Bell crowd wins because they will be spared losses which can never be recouped. Surely 13 years has proved their lack of economic fitness in Austin.

It seems to prove too that profit is the only measure of business fitness.

George Ade said most men are good because it is expensive to be otherwise. After awhile corporations will not break economic laws because of the expense. Morality seems to be an unknown qauntity.

MORAL: Time is a great healer.

Proceedings Before Commissions, Courts and Councils

Discussions and Rulings of State Bodies Having Supervision Over Telephone Companies, Decisions of Courts in Matters of Interest to Public Utilities and Actions of City Councils Relative to Franchises, Rates and Service

Free Service and Uncompensatory Rates Declared Unlawful.

The Minnesota Railroad & Warehouse Commission, on August 25, handed down an interesting decision, in which it ordered the Northwestern Telephone Exchange Co. to desist from the practice of giving free residence service to subscribers of a business telephone, and also that it publish and collect net residence rates no lower than $1 per month. This ruling is regarded as important in establishing a precedent in Minnesota that "cut-throat" telephone rates intended to destroy competition and common business residence rates lower than the sum of the separate rates are unlawful.

This decision is the result of a complaint filed by James Keenan, president of the Interstate Telephone & Telegraph Co., of Austin, Minn., alleging that the Northwestern company is giving free service to subscribers in Austin, Minn., and is also charging rates below the cost of service, with an intent to destroy competition between the two telephone companies in the city of Austin.

The Northwestern company, in 1898, purchased a local plant at Austin, and since that time has maintained a local exchange at that point. In 1903 the Dexter & Mower County Farmers Telephone Co. unsuccessfully sought toll connections with the Bell company's plant at Austin. The business men of Austin were anxious to obtain this connection, so as to be able to communicate with the farmers in the territory covered by the farmers' company, and compete with the city of Rochester for the business of these communities. The leading business men held a conference with the Bell officials relative to this connection, but to no avail.

As a result of this and other complaints relative to the toll service, the Interstate Telephone & Telegraph Co. was organized in 1903 by local parties, and connection made with the rural line referred to. At the time the new company was organized the Bell company had 325 subscribers in Austin. A year later it had but 125. During the next few years it reduced its rates and installed new common battery equipment, yet in the year 1911 it had only added 11 single line business telephones, had lost 25 two-party business telephones and made a gain of 228 two-party residence telephones.

In that year the company further reduced its rates as follows: Single line business, $2.50 per month; two-party business, $2; single line residence, $1; two-party residence, 75 cents. The residence rates were subject to a discount of 25 cents for prompt payment, while business subscribers were given residence service *without additional charge*.

Since the introduction of these rates there has been a pronounced increase in the company's number of subscribers, so that in 1915 the total number of telephones in service was 1,317, as against 590 in 1911.

The Northwestern company testified that in 1914 its gross revenue for operations in Austin amounted to $13,640, while the operating expense, *excluding depreciation*, amounted to $14,437, a net loss of $797.

The rates charged by the Interstate company since 1903

are as follows: Single line residence, $2 per month; two-party business, $1.50; single line residence, $1.25; four-party residence, $1; rural telephones, $1.25. No discount is allowed on these rates. In 1915 it operated 1,662 stations. Since 1914 it has lost 34 two-party residence telephones.

In its opinion, the commission states:

Companies which offer business and residence rates should publish a separate and distinct rate for business telephones and residence telephones, and a so-called combination rate for a business and a residence telephone, which is less than the sum of the regularly published residence and business rates is unlawful. This practice results in giving free residence service, and is also a discrimination against the subscriber of a business telephone who does not use a residence telephone.

Further, the commission states that the Minnesota statutes provide that

No telephone rates or charges shall be allowed or approved by the commission under any circumstances which are inadequate, and which are intended to or naturally tend to destroy competition or produce a monopoly in telephone service in the locality affected.

The history of the struggle between these two companies, shown by the record in the case, proves that the practice of giving free residence service to the subscriber of a business telephone, and of reducing the residence rate to 50 cents per month, was introduced for the purpose of forcing its competitor out of business in that locality, and thus giving to the Northwestern company a monopoly of the business.

The commission's order in this case became effective September 1.

Bulletin on Interpretations of Account Classifications.

Accounting Bulletin No. 11 embodying the interpretations of the accounting classifications for Class A, B and C companies has just been issued by the Interstate Commerce Commission and is being distributed among the various companies. The accounting methods directed in the interpretations contained in this accounting bulletin were approved by the Interstate Commerce Commission on June 26, 1916, and prescribed for the use of telephone companies having annual operating revenues exceeding $10,000, effective July 1.

This accounting bulletin contains answers to accounting questions which have been raised since the issuance of the systems of accounts for Class A, B and C companies and is published in order that uniformity may be had in the application of the rules laid down in the systems of accounts. It is supplementary to, and should be used in conjunction with, the systems of accounts prescribed for Class A, B and C companies.

In the preparation of this bulletin, the Interstate Commerce Commission has had the co-operation of a joint accounting committee representing practically all the large telephone companies, both Independent and Bell, and a large number of the smaller companies. This bulletin was submitted in tentative form to the commissions of the several states having supervision of telephone companies and criticisms and suggestions were invited. Those received, Fred W. Sweney, chief examiner of accounts, states, have been given careful consideration in the completion of the bulletin as now issued.

Maysville (Ky.) Franchise Controversy Settled.

Differences between the Maysville Telephone Co., of Maysville, Ky., and the city administration, relative to the validity of the company's franchise, have been smoothed out. S. M. Heller, of Louisville, Ky., general manager of the Central Home company, of which the Maysville company is a branch, appeared before a session of the city council, and, in the interests of harmony, proposed that the Maysville company would surrender the questioned franchise and return to the former rates until January 1 next, if the city would create an identical franchise which the Maysville company will purchase. This proposal was agreed to, and the company and city will proceed accordingly at once.

In making the proposition, Mr. Heller stated that the officers of the company and its attorneys were convinced of the legality of the present franchise and the soundness of their contentions, but that they believed the best interests of both company and community would be served by the plan proposed, instead of possible controversy and litigation.

The new franchise, it is expected, will be in readiness by about the first of the year. It was urged that the fact the president of the company was a member of the council which passed the former franchise invalidated it.

To Test Powers of Philippine Utility Board.

A special cable dispatch from Manila states that a controversy between the board of public utility commissioners and Philippine public service corporations, dating back a year or more, is to be settled by the Supreme Court of the United States. This will settle the question of the power of the board to require annual reports from all public service corporations.

The act of the legislature which establishes the board of public utility commissioners gave the board this authority, and the board has been requiring all transportation companies, carrying passengers either on land or water, to file financial and operating expenses.

Several transportation companies challenged the board's authority, and the case went to the Supreme Court of the Philippines. That body decided that the part of the organic act establishing the board which gave it the power to demand annual statements was invalid because it delegated legislative powers to an executive or semi-judicial board. From this decision the board has now appealed to the Supreme Court of the United States.

Ordinance to Be Drawn for Merger in Austin, Texas.

The proposed merger of the two telephone exchanges in Austin, Texas, which has been under consideration during the past six months, has finally been acted upon favorably by the city. A conference was held between the mayor and members of the city council, and representatives of the telephone companies, on August 25, at which it was decided that an ordinance should be drawn authorizing the consolidation, and granting a new franchise in the city to the Southwestern Telegraph & Telephone Co., which will absorb the local exchange of the Austin City Telephone Co.

The matter will come up again before the city council early in September, and if it is passed upon favorably by that body, an election will probably be held in October, and a vote of all the citizens taken upon the plan.

Summary of State Commission Hearings and Rulings.

CALIFORNIA.

August: The commission issued a supplemental order modifying its decision authorizing the Consolidated Securities Co. to sell its telephone system at San Fernando, Cal., to the San Fernando Telephone & Telegraph Co. The supplemental order grants permission for the transfer to become effective when the company has sold $10,000 of the stock at par or received bona fide subscriptions in that amount.

August 16: Application filed by J. A. Coley and J. L. Craig for permission to sell the Coley-Craig-Escalon Telephone Co., of Escalon, Cal., to the Pacific Telephone & Telegraph Co. for $4,000.

IDAHO.

August 22: Brief filed by the plaintiff in the case of the Mountain States Telephone & Telegraph Co. vs. the Project

Mutual Telephone & Electric Co., of Rupert, Idaho. It is alleged by the plaintiff that the defendant is invading its territory in Minidoka county without first having secured a certificate of public convenience and necessity. The defendant company contends that it is operating as a mutual company and not for profit, and, therefore, does not require a certificate of necessity.

INDIANA.

August 19: Application filed by the Consolidated Telephone Co., of Danville, Ind., for permission to sell its entire telephone system in Hendricks county to the Indianapolis Telephone Co. The Consolidated Telephone Co. operates exchanges at Fayette, North Salem, Brownsburg, Pittsboro, Plainfield and Danville, with a total of about 1,700 subscribers.

KANSAS.

September 12: Postponed bearing on application of the Missouri & Kansas Telephone Co. for permission to increase its rates at Wellington, Kan.

MAINE.

August: The New England Telephone & Telegraph Co. was granted permission to issue 6,772 additional shares of stock, the proceeds from the sale of which are to be used for improvements and extensions in that state.

MINNESOTA.

August 25: Upon complaint of James Keenan, president of the Interstate Telephone & Telegraph Co., of Austin, Minn., the commission ordered the Northwestern Telephone Exchange Co. to cease and desist from giving free residence service to subscribers of a business telephone in Austin, Minn.; also that it publish and collect net residence rates no lower than $1 per month.

MISSOURI.

August 28: In the matter of the complaint of the Gilliam (Mo.) Telephone Co. against the Alton-Slater Water Co., the commission, after making an investigation of the matters involved, ordered the defendant to appear before the commission at its office in Jefferson City, on September 11, and show cause why the order granted by the commission on April 24 should not be set aside or modified by attaching such conditions thereto as shall require the defendant to install and operate its transmission line in a manner that will protect the public traveling on the highway, and using the complainant's telephone system, from injury by high voltage current. The commission's order of April 24, previously referred to, authorizes the Alton-Slater Water Co. to construct, maintain and operate an electric power transmission line upon the public highway in Saline county, Mo., in accordance with a franchise granted by the county court of Saline county on February 11, 1916.

September 18: Hearing in the matter of adopting a uniform system of accounts for telephone companies. Every telephone company in the state has been given notice that it will be expected to be present or to be represented, and to introduce any evidence necessary to assist in the promulgating of a uniform system of accounts for telephone companies. Case 937.

September 18: General conference in which representatives of all telephone companies in the state are to meet with the commission and to introduce all testimony and evidence required in the adoption of uniform rules, regulations and practices.

NEBRASKA.

August: Because of complaints recently filed by stockholders in the Surprise (Neb.) Telephone Co., protesting against the sale of a part of its property to the Lincoln Telephone & Telegraph Co., of Lincoln, Neb., the commission called upon the Surprise Telephone Co. to furnish detailed information regarding the terms of the sale, showing how much of the property was transferred and how it plans to reduce the capital stock in proportion to the reduced valuation of the property.

August: The commission dismissed the complaint filed by Beaver City against the Beaver City Telephone Co., demanding that a 24-hour week-day and Sunday service be furnished. At present, the night service and the Sunday service are limited. The commission states in its findings that the patrons cannot expect full 24-hour service at the rates they are paying and that if they want better service they must pay more. The company has just filed an application for authority to increase the rates 40 cents per month on all classes of telephones, with a rebate of 15 cents for payment by the 10th of the month.

OHIO.

August 21: The commission granted the appeal of the Lima Telephone & Telegraph Co., of Lima, Ohio, for another appraisal of its properties by the commission's engineers. About a month ago the commission handed down an opinion cutting the valuation of the company from $950,000 to $750,000, thereby cutting the rate-making basis of the company. The latter appealed on the grounds that the inspection and examination by expert engineers trained in appraisal work was not sufficiently at variance from that of the company to justify the decrease made in the duplication value.

In order to hasten final adjudication of the case, without the possibility of further delay, the commission has ordered a crew of six engineers, under the directorship of H. T. Jenks, to remain in Lima until the task has been completed. The appraisal will probably require several months' work.

August 24: Upon the supplemental application of the receivers of the Central Union Telephone Co. and the Home Telephone Co., of Ironton, Ohio, the commission issued an order confirming the order made and entered on October 5, 1912, authorizing the Home company to purchase and acquire the property of the Central Union Telephone Co. within the exchange area of Ironton and with the provision of a physical connection between the systems of the applicants for the interchange of toll service. The commission further ordered that the Home Telephone Co., of Ironton, may charge for such service rates not in excess of the following rates which it has found to be reasonable:

Rates Per Year.	Ironton.	Coal Grove, Hanging Rock Sedgwick, O.	Russell, Ky.
Business stations, individual lines	$45	$51	$51
Business stations, auxiliary individual lines	35	39	39
Business stations, two-party lines	....	30	30
Residence stations, individual lines	27	33	39
Residence stations, two-party lines	21	27	33
Residence stations, four-party lines	....	21	21

Farmer line stations, Ironton exchange service—Ohio side of Ohio river: Ten-party farmer line stations, business, $27; ten-party farmer line stations, residence, $21.

Farmer line stations, Ironton exchange service—Kentucky side of Ohio river: Ten-party farmer line stations, business, $33; ten-party farmer line stations, residence, $24.

August 28: The commission granted the joint application of the Central District Telephone Co., the Washington Telephone Co., the Jefferson Telephone Co., the Union Telephone Co. and the Woodsfield Telephone for the consent and approval of the sale of the four last-mentioned companies to the Central District Telephone Co. Order No. 645.

SOUTH DAKOTA.

July 18: In considering the complaint of Dell Clement relative to the alleged refusal of the Banner Telephone Co., of Tennis, S. D., to furnish him telephone service, the commission made an investigation into the practices of the defendant, as well as of its switching connections with other lines and the compensation therefor. As a result of the investigation, the commission ordered the Banner Telephone Co. to enter into written contracts with the Dixon Telephone Co., of Seneca, the Hyde County Telephone Co., of Highmore, and every other company with which it has failed to enter into written contracts covering switching relations. The company is further ordered to establish and promulgate a schedule of reasonable rental rates and to construct the necessary extensions to furnish telephone service to the complainant, Mr. Clement. Order F—319.

WASHINGTON.

July 25: The commission dismissed the complaint of G. L. Davall, et al., of Whatcom county, near Bellingham, Wash., relative to the refusal of the Pacific Telephone & Telegraph Co. to furnish them telephone service. The commission found that under an agreement for the division of territory between the Farmers Mutual Telephone Co. of Whatcom county, and the Pacific company, the plaintiffs' residences are within the territory of the Farmers Mutual company and they should obtain telephone service from that company. Order 1,999.

WEST VIRGINIA.

September 12: Hearing on the application of the four Bell telephone companies of West Virginia for a proposed consolidation. The companies include the Consolidated Telephone Co. of West Virginia, with offices in Wheeling; the Chesapeake & Potomac Telephone Co. of West Virginia; the Central District Telephone Co. and the Chesapeake & Potomac Telephone Co. of New York. These companies have 45,000 Bell stations in West Virginia. The proposed name for the merged companies is The Chesapeake & Potomac Telephone Co. of West Virginia. Protests against the merger may be filed by any subscriber or citizens of the state.

Plain Facts About the Maintenance of Telephone Plants

What Maintenance Includes and How It Should Be Taken Care of—A Paper Presented by the Division Plant Superintendent of the Chesapeake & Potomac Telephone Co. at a Conference of Connecting Company Men—Reprinted from The Transmitter

By R. L. Wright

The term "maintenance" is one denoting upkeep or support. Large corporations make special provision for maintenance and depreciation reserves, based on the well-known fact that machinery deteriorates and the replacement of that machinery as a going concern must be made under the head of current expenses in order that the finances of that corporation may not be affected. Depreciation reserves are obtained by the laying aside from the gross revenue a certain amount of money each year, ascertained by taking the life of the plant covered by the reserve and prorating it into the original cost, plus interest and taxes, so that when the machinery has lived its life an amount equal to or slightly greater than the original cost will be in the reserve for the replacements.

The definition given by our company's auditor is as follows: Maintenance should represent the cost of keeping the plant in good working condition and should be charged with all replacements and changes which do not increase the investment of cost of the plant.

Classification of Maintenance.

Maintenance is divided into the following kinds: 1. Ordinary repairs; 2. Rearrangements and changes; 3. Extraordinary repairs.

Ordinary repairs represent keeping the plant in good working condition. Rearrangements and changes represent the cost of rearranging and changing the location of plant, provided no replacements are made.

Extraordinary repairs are divided into two classes: (a) The restoring of plant damages by storms, floods, fires and landslides; (b) changing made necessary by rearrangements due to municipal, state or federal regulations.

It will be seen from these working definitions, as given for our company, that maintenance means keeping the plant in good working condition for its full life. This expense, together with depreciation reserves plus the labor cost and operating, with the amount expended for new construction and gross expenditures, is the amount needed for carrying on the business.

In nearly every item, maintenance is a contiguous item of construction—that is, maintenance is always an accompanying feature when construction is passed on. The maintenance of the central office represents over 50 per cent. of the maintenance charges in the average telephone plant.

This charge in plants where open wire is used will be materially reduced in proportion to the whole if good construction is installed in the central office. If the proper maintenance is not given to the central office equipment, the life of this chief item of telephone service is greatly reduced and its usefulness curtailed to such an extent that it often becomes a bugbear to the system, resulting in the necessity for additional investment before proper return has been made on the material originally installed.

The results of numerous items of switchboard maintenance which have come under our attention through the inspection of some connecting companies show that poor and makeshift repairs result in over 60 per cent. of the troubles experienced by them. This indicates the need of more careful consideration of the switchboard—it must be given attention commensurate to its value to the telephone service.

If a telephone line is well constructed in the beginning, inspected regularly from time to time with an idea to repairing the resulting minor effects of weather, the expense of maintenance is spread in small amounts over regular periods of time. If such inspections are not made and kept well in hand, it does not take long to bring about a condition where the expense quickly becomes a burden and soon results in the necessity for large amounts for rebuilding.

It is imperative from the point of view of commercial service, that the wires on the line be properly insulated; that the drop wires to the subscribers' residences be solidly and permanently connected to the main line wire; that at each house the connections between the wire and the instrument be made in the best possible manner and that a substantial and effective ground be placed at each instrument.

It is not economy to try to obtain a year's longer life from a rotten pole. That pole may cause the loss of a life because the doctor could not be called. It may cause the loss of stock because the veterinarian could not be reached. It may cause loss of money to your subscribers because they cannot be notified of market changes, or of the need of immediate action to close a deal where competition is concerned.

It may not be the pole. It may be the cross arm, the lack of a guy, the rusty condition of wire not replaced when trouble was first noted, the carbons in the station improperly cleaned; or it may be any one of those small individual faults which are the inherent accompaniment of the telephone business. They must be watched with that painstaking vigilance which characterized "Argus of the Hundred Eyes" in the fable.

Ordinary Repairs.

Under ordinary repairs we have the testing for trouble on the line and the clearing of that trouble. We have the constant watching of those lines to prevent trouble; the trimming out of tree branches which interfere with the proper operating of the line; the cutting down of trees which are dangerous and may fall on the line; replacing sections of rusty wire which show promise of giving trouble, or putting into practice the old proverb, "an ounce of prevention is worth a pound of cure."

Under the head of rearrangements and changes we have such items as moving a pole, a guy, an arm or wires to a different location, other than that originally established, except as mentioned under extraordinary repairs. These changes are the same as those under repairs, simply making for the bettering of the existing line, without adding to the value of the line as an investment charge.

Extraordinary repairs cover work to keep plant in shape when the cause is storm, flood or like natural causes, or when due to changes caused by governmental regulation or new improvement.

All of these are for one result—to make possible the best telephone conversation practicable in order that a conversation may take place over the greatest possible distance asked by a subscriber. This company's ideal is to make possible a conversation from any telephone to any other telephone, any place in this country or, I may say, any place on this continent.

Under extraordinary repairs, therefore, are embraced all the general minor items that go to make up the daily routine which is the price of good maintenance. The result is possible only through the constant, unceasing inspection and re-inspection, repairs and re-repairs, maintained and re-maintained, here, there and everywhere, every day, through storm and fair weather, and through the feeling of each of our men that they are responsible for all the results obtained. It has been our experience that the results are well worth the constant effort.

It is our hope in presenting this matter to you to show you that your companies are dependent on us for the reaching of your markets, for the reaching of your friends far removed and for your everyday need and that we in return are dependent on you for our subscribers to reach their market among your subscribers, and to transact business to mutual benefit.

Our first-class plant—we call it so, for it is our aim to make it so—is of no avail to the subscriber trying to talk to Triangle Corners if the subscriber there is reached by a poorly maintained line. It is our hope that we can show you the benefit of this class of work, that we can show you, through our commercial, traffic and plant help, that it is better to have lines that do give good service than lines that may give service. It is our endeavor to show you by example, by actual aid of inspectors, advice and data of all kinds how to obtain these results, not by a huge outlay of money, but by a minimum expenditure for the best results.

In conclusion, let me sum up the subject of maintenance by saying that in the expenditure of any company the items of maintenance are far more important in the sense of bringing returns than the new construction.

The reasons for maintenance are: The preservation of plant investment, and the getting of the proper return for the money already in plant before it is necessary to replace that plant from the reserve fund.

The main things necessary for maintenance are a plant rightly constructed to maintain and a man who understands the job. He must see that the lines are kept free from trees and debris. He must see that the circuits on the lines are kept properly insulated and transposed. He must see that the connections made in the line are electrically solid, and to this end should be made to use sleeves on his wires. Hand joints are one of the most prolific sources of trouble known. All connections at the central office should be inspected periodically, as they have a tendency to become loose.

Where companies are using phantom circuits (and to all companies the use of phantom circuits is recommended) care must always be exercised to see that the side circuits are balanced. This test should be made often in order that the proper use can be had from the phantom.

Constant attention by periodical inspection of details is necessary in order to keep down expenses. Cutting of trees and underbrush, pulling of slack out of wires, repairing broken and loose ties and loose connections, replacing broken pins and pins pulled loose as well as brackets which have split and guys which have become loose or slipped, are among the many important details.

These regular inspections by the men will also bring to light any cases where one has maliciously interfered with the service or where electric light companies in constructing new lines are encroaching on the rights of the telephone company.

Just a Hint.

Don't mumble your number until it resembles
A mixture of Chinese and Choctaw by freight,
And hope the miraculous maid at the "Central"
Will get it, translate it, and pass it on straight.

Business and Telephone Conditions in Chili.

In the report of the Chili Telephone Co. for the year ending March 31, 1916, presented by George Keith, the managing director, it was stated that Chili suffered greatly in consequence of the war which closed her principal markets for the export of nitrate, her chief source of revenue.

Since the commencement of the year under review, the demand principally by the United States, for nitrate to manufacture explosives, has in a measure covered the loss of the European markets. The works which were closed at the end of 1914 have been re-opened, and the output shipped to the United States and other neutral countries. High prices also benefited mining and agriculture, increasing the export of these products. Then came the stoppage of the Panama Canal and with it lack of shipping and high freights, greatly delaying and restricting Chili's exports and imports, which reacted badly upon the general economic condition of the country and the telephone business in particular.

A large number of subscribers was connected during the year, but the net increase was much reduced by those who had to give up their telephones in consequence of necessary economy or bad business. The revenue increase from this source was thereby much reduced. There was, however, a large increase in fee message and miscellaneous receipts, and the whole sterling income was also considerably enhanced by the higher value of the Chilian currency in which it was collected during the year.

The revenue in Chili from all sources shows an increase of $47,885 (£9,577) and the total revenue, including interest on investments and transfer fees, amounts to $609,865 (£121,973), or $48,060 (£9,612) more than it was last year. The working expenditure in Chili also shows an increase of $27,195 (£5,439) and absorbs 52 per cent. of the revenue, or about the same as last year. The high price of materials, and the cost of repairing the damage done to the overhead plant by the large fires which occurred in Concepcion, Talcahuano and Valparaiso, added considerably to the maintenance expenses for the year.

The total expenditure amounts to $361,940 (£72,388), or $39,960 (£7,992) more than it was last year. The result of the year's working is a credit balance of $247,925 (£49,585), of which the sum of $13,220 (£2,644) was expended in Chili during the year on replacements of plant.

An interim dividend of 3 per cent. was paid in January. After carrying $92,885 (£18,577) to the general reserve and $10,000 (£2,000) to the depreciation reserve fund, the directors recommended the payment of a final dividend of 5 per cent., making, with the interim payment, a total distribution for the year of 8 per cent. on the share capital, free of income tax, the same as last year, and carrying forward $21,510 (£4,302), as compared with $21,690 (£4,338) last year.

Among the new work carried out during the year may be mentioned the purchase of a site at Vergara, in the Vina del Mar district, upon which a new exchange building has been erected. A house has also been purchased for the exchange at Melipilla. New offices have been opened and equipped at Diaguitas, Chanaral, Alto, and Vilcun, and several inter-town lines have been erected in the central and southern districts. A new switchboard has been imported for Santiago, and is being installed.

Since the commencement of the current year the demand for nitrate and metals continues, and production in Chili is now as large, if not larger, than it was before the war, and is now being exported principally to the United States. The company's business up to the present is making steady progress, and the outlook for the current year is very promising. The company is being ably represented and managed in Chili. The property and plant are being maintained in a high state of efficiency, and every attention is paid to give a good and satisfactory service.

Operators at Monroe, Wis., Enjoy Four Days' Camp.

While a picnic always provides a day of amusement, it seldom provides any rest. For this reason, the United Telephone Co., of Monroe, Wis., of which P. J. Weirich is general manager, decided to hold a four days' camp for its operators this summer, in place of the usual picnic. The accompanying illustration shows the setting of the camp which was located on the Ludlow farm, only two miles from the company's office in Monroe.

Fifteen girls were in the camp at night and during the day the girls enjoyed the camp in shifts of eight. As it was only a ten-minutes ride in an automobile between the camp and the company's offices, the necessary shifts in the operating force were easily made.

The camp, which was enclosed in heavy wire fencing, consisted of a large sleeping tent equipped with cots, and a dining tent in charge of a cook employed by the company. Mrs. P. J. Weirich had charge of the larder. At night large Japanese lanterns provided illumination.

The needs of the camp, aside from the labor in preparing the meals, were set forth on a bulletin posted in the tent, calling on volunteers for carrying water from the spring, gathering sticks for the fire, or going to a neighboring farm for milk, to which tasks the girls cheerfully responded.

Setting of Operators' Camp, Near Monroe, Wis.

It is said that the girls were enthusiastic over the innovation and it is believed to have been a great success.

Merger of Two Exchanges in Waco, Texas, Completed.

The local exchange of the Southwestern Telegraph & Telephone Co. in Waco, Texas, was cut over to the new exchange of the Texas Telephone Co. in Waco at 11 o'clock on the night of August 19, completing the merger of the two exchanges in Waco as authorized by the city commission of that city in August, 1914. About 1,000 Southwestern telephones were added to the Texas company's exchange, giving the latter company a list of some 6,500 subscribers in Waco and the suburban towns adjoining.

The Waco consolidation was the first to be authorized in a city of that size in the Southwest. Agitation on the proposition was begun early in 1914 by the McLennan County Medical Society, which petitioned the city commission to compel the competing telephone companies to eliminate one exchange in the city.

At the request of the commission, the Chamber of Commerce and the Young Men's Business League of Waco investigated the matter very thoroughly, and approved a consolidation on a basis of $5 per month for business telephones, which represented an increase of $1 per month, and $2 per month for residence telephones, this being the same rate as was charged by the separate exchanges. These organizations figured that approximately 1,500 duplicate telephones would be eliminated by the merger, and the citizens of Waco saved more than $30,000 per year in telephone bills.

The city commission approved the merger on that basis, with the additional requirements that the succeeding company erect a modern telephone building, install new equipment throughout, and rebuild the outside plant. The Southwestern company agreed to sell to the local company, and the construction of a modern, three-story fireproof telephone building was begun by the Texas Telephone Co. October, 1915, and completed in June, 1916. On June 10, 1916, the Texas company cut over from its old to its new exchange, and on August 19 cut over the Southwestern telephones to the new exchange.

The toll lines of both the Texas and the Southwestern companies are connected to the new exchange, subscribers having the option of specifying the long distance lines to be used for their calls. Space for the Southwestern toll board and terminal room is rented that company in the Texas Telephone Co.'s new building.

The new building of the Texas Telephone Co. in Waco is said to be one of the most modern of its kind and size in the country, and embodies many new and some unusual features. The state fire insurance commission has recently promulgated for this building the lowest insurance rate of any business building in that part of the state, 16 cents on the $100.

Following the example of Waco, a number of smaller cities. and towns in the vicinity, in Texas, authorized mergers of their telephone systems, of which a number have already been consummated. These include Port Arthur, Marlin, Mart, Meridian, Moody, Walnut Springs and Clifton, in all of which places the Southwestern exchange has been taken over by the local company. The city of Temple has authorized a merger, which has not yet been completed.

Managers' and Wire Chiefs' Meeting at Beatrice, Neb.

A meeting of the managers and wire chiefs in the southern district of the Lincoln Telephone & Telegraph Co., of Lincoln, Neb., was held in Beatrice, Neb., on August 18. Following the inspection of the plant of the Lincoln company in Beatrice, the meeting proper was called to order in the commercial club rooms, with 25 managers and wire chiefs present.

A. Newman, of Nebraska City, gave a report of the steps he had taken to remedy bad conditions in his exchange. M. T. Castor, plant superintendent, and G. K. Gann, traffic superintendent, both of the Lincoln exchange, gave interesting talks on plant and traffic matters.

H. A. Seamark, of Beatrice, spoke of the importance of promptness and accuracy in the making of reports and plant accounting. A general discussion followed.

The telephone company has adopted a plan of holding these meetings each month with a view of eliminating conditions which impair the efficiency of telephone service.

Convention of Telephone Pioneers in October.

The Telephone Pioneers of America will hold their sixth annual meeting on October 19 and 20 at the Georgian Terrace Hotel, Atlanta, Ga. Arrangements have been made with the Pennsylvania Railroad for a special train, leaving New York Tuesday, October 17. A stop of six hours will be made at Washington, D. C., where a tour of the city by automobiles and dinner at one of the leading hotels will be arranged. On the homeward trip stops will be made at Chattanooga, Tenn., and Asheville, N. C.

Toll Line to Be Rebuilt.

The New England Telephone & Telegraph Co. will shortly rebuild its so-called Garland toll line, extending from Dexter, Maine, to the Garland town line via the Charleston road.

What is Your Annual Bill for Renewals?

It Can be Reduced to an Insignificant Minimum

Creosote Your Poles

750,000 to 1,000,000 poles are consumed annually to *replace decayed poles.*

Assuming the average telephone pole to be 6 inches top and 30 feet long the actual cost of these poles at the yards at present prices would be $2,500,000 to $3,500,000.

95 per cent of all poles are destroyed by decay unless they are treated with some efficient preservative.

An efficient wood preservative for the average consumer must meet his needs. It must be coal-tar creosote oil properly refined for the purpose. It must be Barrett's Carbosota Creosote Oil, which is economical, effective and easy to use.

The largest telephone company in the world uses this material because its worth has been proved.

Barrett's Carbosota Creosote Oil is not a patent product, a proprietary preservative which is marketed under a mysterious trade name.

It is merely the best grade of creosote oil which it is possible to produce, made especially liquid so that it can be conveniently used under all conditions with the best effect.

Barrett's B Carbosota Grade-One Liquid Creosote Oil

Each year added to the life of a pole decreases your annual charges.

Experience proves that treating your poles with Barrett's Carbosota Creosote Oil pays.

Booklet regarding the treatment free on request to nearest office.

Special Notice Regarding Change in Name

Since we introduced Grade-One Liquid Creosote Oil, numerous imitations have appeared on the market. For ease of identification, therefore, we have decided to change the name of this product and hereafter it will be known as BARRETT'S CARBOSOTA—Grade-One Liquid Creosote Oil.

The Barrett Company

New York Chicago Philadelphia Boston St. Louis Cleveland Cincinnati Pittsburgh
Detroit Birmingham Kansas City Minneapolis Nashville Salt Lake City Seattle Peoria
THE PATERSON MANUFACTURING COMPANY, *Limited*: Montreal Toronto Winnipeg Vancouver
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Please tell the Advertiser you saw his Advertisement in TELEPHONY.

Practical Subjects—Letters and Discussion

"Telephony's" Home Course for Telephone Men.

(Not meant for study.)

By Well Clay.

THE SWEETHEART OF THE "CORN."

A human wreck was he, unshaved;
His clothing—rags and grime;
A shifting eye, a sullen mood;
His face was writ with crime.

He slouched along the darker side,
Nor mingled with the throng
That filled the brighter streets with life,
With laughter and with song.

Shunned by all that passed him by
And shunning all in turn,
He met no eye, he spoke no word,
Nor sympathy did yearn.

And who, you ask, is this outcast,
That wanders so forlorn?
He's just a common drunkard,
A sweetheart of the "Corn."

Isn't it awful what habit will bring a man to? For it is habit, I believe, more than desire, in most cases, that brings a man to do the things that are for his undoing. A person just hates to change a fixed habit. Just try changing even a few of your mild ones and see if that is not so.

And speaking of this question of habit: Isn't it habit as much as anything else that makes a telephone company keep on trying to give $18 service for $12? And, too, isn't it really only a community habit to expect to get free connections with neighboring towns?

Isn't it only a habit with some people when they come in to pay their telephone bill to "kick" on the size of the bill and dispute the number of messages, or the elapsed time with which they were charged? Isn't it a pretty good habit that most of us have got into in such cases to be diplomatic and smooth things over rather than "going up in the air" and making things worse?

We pride ourselves sometimes on our growing ability to hold our tempers and being calm and patient in such cases, as if we were acquiring new virtues, when, as a matter of fact, isn't it merely that we have formed the habit of working along the line of the lease resistance to save trouble?

The habit of always kicking is not so bad, perhaps, as the habit that assisted in the "make up" of our friend in the above verses, but it is not a pleasant habit to acquire nor an easy one to get rid of, once we have gotten it firmly fixed.

Do you know that I have even heard of telephone men themselves, with all the influence of bad examples daily before them, doing a little kicking once in a while when they paid their supply bills. I have done it myself (I mean kicked).

It may be that the salesman who took your order for dry batteries, "to be shipped on the first train tomorrow," really forgot to send the order in for a day or so and the batteries came along next week. It may be that when you ordered several articles the salesman failed to tell you that some of them would have to come from an Eastern factory and some from somewhere else, so that it resulted in two or three shipments with separate dray bills and additional freight.

It may be that he gave you the impression that his house "always carried all such things in stock" and you were led thereby to put your order in as you did. It may be that some articles which were shipped separately by mail had to carry an extra burden of postage as well as an unauthorized charge for insurance, which added several per cent. to its cost, when, had you known the conditions, you would not have ordered it when it could not have been shipped in with the rest of the articles.

Sometimes it is all right to kick if you kick in the right spirit, but to grumble every time you make a remittance just because it has become a habit is just as foolish in one person as the pursuing of a habit until it "gets you" is to another.

Maybe the salesman is doing a little mental kicking about your habit of taking off 2 per cent. even after the allotted ten days are up from the date of the bill, just because you had only received the goods, which had been delayed somewhere along the route. Perhaps the clerk at the house kicks because you send in an almost illegible scrawl which, when deciphered, tells him to ship some goods "same as the last," which necessitates his overhauling a lot of back orders and duplicates of shipments to see what "the same" was.

In a wholesale house, with its multiplicity of orders daily, the only time such phraseology fails to mean a search through the files is when the words "the same" are spoken in the clerk's presence down at the corner after he has "ordered" and asks the country customer, who is in town, to "name his."

It might also be that the wholesale house might do a little kicking because the country customer waits until he has used the last pair of dry cells before he thinks to order more and then expects to have a shipment reach him the day he telephones the order.

Perhaps you feel like kicking to your operators after you have told them for the thousandth time not to shove in cords with their thumb, when putting up a connection, thus breaking off the wires in the cord, and then to see them do it same as ever in a day or so.

I have known managers to kick because threshing machines, in the fall, broke from one to three wires every time they moved from one job to another, because the operators always forgot or were too careless to lower the blower on the stacker.

There have been cases on record, so I am told, where house movers kicked when asked to pay a bill for removing wires, to let them through with some building. Of course, such cases are rare but I cite them so as to show the trend of the kicking habit and to demonstrate how universally it is to be found among all classes. If you think long and carefully you may be able to remember some additional cases of like nature to add to this list so I will not take up space by giving more examples.

As I said before, judicious kicks are all right and help things along like a man swimming. When he kicks right he is propelled by his efforts, but when he merely churns the water in a frenzy, without thought or proper application, he just gets himself into serious trouble or at the most he exhausts himself and gets nowhere.

Job was, as the Bible tells us, a good man with bad blood, or at least we draw that conclusion as to the latter statement because he had such a habit of having boils. And history records the fact that he lamented and lifted up his voice, which was the way they expressed it in those days, but which was just plain kicking. He found that it did no good to kick at something that could not be helped and thus gained wisdom, and we should follow his example.

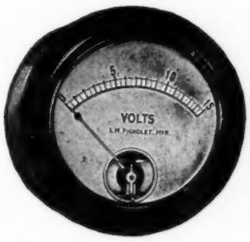
APHORISM: It is better to think without kicking than to kick without thinking.

Telephone Order System Used By Public Service Company.

By Wilfred G. Astle.

The system of handling customers' applications for electric light and power by means of the telephone described in this article is used by a large public service corporation in Illinois. It has been very successful in expediting the work of connecting up customers' installations to the central-station system.

The telephone arrangement of this company's application



Trouble Detectives!

PIGNOLET Portable Testing Meters will locate any kind of trouble besides measuring volts and amperes; will also determine resistance of coils, lines, ringers, etc.

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Suppose you let us send you a copy of the PIGNOLET Catalogue. It's worth while.

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Increases Toll Earnings

The
PHONE-METER
$3.50

A Practical TOLL-TIMER for the Small Exchange

(Cut ½ actual size.)

Hundreds of telephone companies in 34 states are using Phone-Meters. Why don't you?

The Phone-Meter is accurate, serviceable and adapted for the small exchange where an expensive device is not justified.

"Our girls are tickled to death with it, as we had many disputes with the Bell operator before we used it," writes one exchange manager.

"The Phone-Meter is satisfactory and we'll want more of them," writes another manager, and a few days later came the order.

Order yours now. Send for descriptive folder.

Gunmetal case, Hardwood base.....$3.50 net

Sent prepaid and guaranteed one year

Manufactured and distributed only by

Graves Timing Device Co.
2600 Pennsylvania Ave. Philadelphia, Pa.

Warner Pole Changers

20 Years in Service; Over 20,000 in Daily Operation

The first successful pole changer made.

It revolutionized "ringing conditions" in the telephone field; and set such a high standard then that it has never been equaled.

Economical and reliable, it has stood the test of long service, and is pronounced the one perfect pole changer by the leading telephone men of the country.

Let us solve your ringing problems.

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Insulated Staples
4 Sizes
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STAPLES best for wiring.
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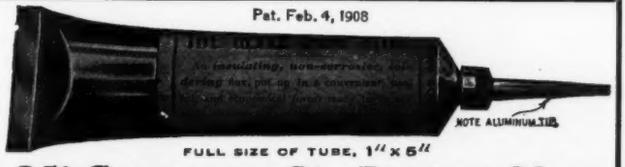


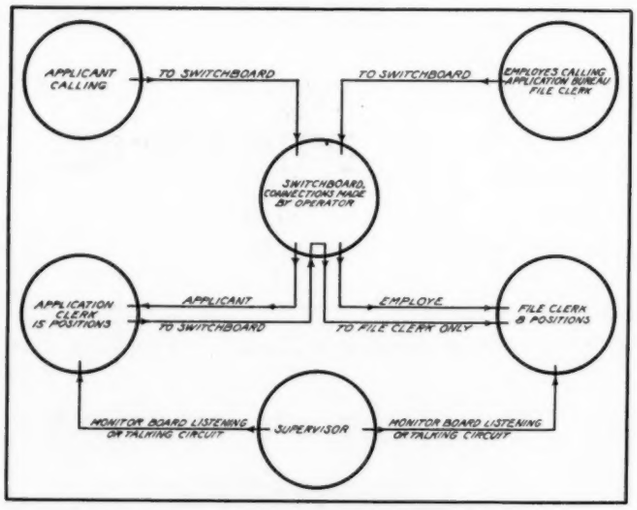
FULL SIZE OF TUBE, 1" x 6"

Blake Signal & Mfg. Co., Write for Samples 251 Causeway St., Boston, Mass.

bureau is illustrated by the accompanying drawing. The applicant calling is connected through the general telephone switchboard of the company to an application clerk. This man, who is constantly employed talking to the customers, is trained to talk courteously and clearly. If necessary, he obtains the information through the switchboard from a file clerk and informs the applicant of the status of the order. Provision is made by which the other employes of the company may talk with the file clerks. A supervisor of the telephone order system sits at a monitor board and can listen in to the conversation of any application clerk or any file clerk. There are 15 positions for application clerks and eight for file clerks.

This application bureau enables the company to supply all applicants with authoritative information relating to pending orders in a courteous manner and in the shortest possible time. This bureau is also equipped to take applications for residence service, to put through disconnect orders and handle cut-off orders, salesmen's calls or suggestions, changes in original orders, and to supply miscellaneous information relating to electric service.

The company uses a classification by street numbers rather than by customers' names, it having been demonstrated that this



Schematic Plan for Handling Telephone Applications.

is more accurate, although the name is used for checking purposes. The file clerk files original orders, reads the reports regarding pending orders and removes completed orders. All files are constantly checked by each file clerk to prevent errors. In order to provide a further check one clerk is constantly employed checking all files.

The application clerks are men conversant with the policy of the company, and have received special schooling and training in the methods used in executing orders. Applicants for service are referred to the application clerks. If they wish service in a residence, the application is taken, the formal order to be signed later when the representative calls. Should the applicant be a storekeeper or manufacturer, a salesman is assigned to make a call on the same or following day, depending upon the time the order is received.

If any inquiry is received relative to a pending order, the applicant is requested to give his name, address and telephone number, and "to hold the wire." The application clerk then reverses the two telephone switch keys, in this manner holding the applicant on one line, and then requests the switchboard operator to connect him with the particular file clerk having charge of the division in which the applicant's street number comes.

The application clerk then asks: "What is holding (street number)?"

The file clerk replies: "What is the name?" to avoid giving incorrect information. If the name supplied by the application clerk agrees with the street number, the reason or reasons for the delay in making the connection are given.

Information necessary to keep the pending orders up to date is forwarded to the application bureau as soon as possible after the receipt of the orders.

The time required to read and answer an inquiry depends both on the ability of the application clerk to comprehend the applicant's question and upon the applicant's ability to talk over the telephone. The file clerks supply the information required in from 25 to 45 seconds, and usually the entire transaction consumes from one to one-half minute. Where the applicant is not fully satisfied, he usually asks for the manager, in which case the manager is the supervisor of the application bureau. In all ordinary cases he is able to satisfy the applicant that the information previously given is correct.

Lessons From Recent Threatened Railway Strike.

By James H. Shoemaker.

The strike led by Eugene V. Debs, in the summer of 1894, was probably the nearest approach our nation has ever had to the present quarrel between the trainmen and the managers of our railroads. There are certain similarities, of course, but we may gain a certain amount of benefit by considering the differences rather than the parallels of the two cases.

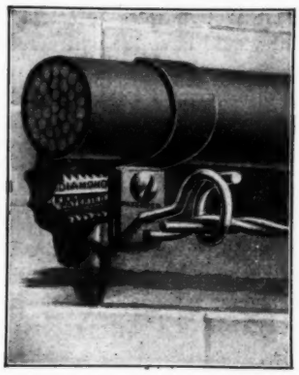
The sympathetic strike is an attempt of wage-receivers to decide, by force of their own wills, matters affecting their fellow servants. After this lapse of practically a quarter of a century it is easy to overlook the fact that the Debs affair was wholly sympathetic in its demands. In the beginning it was called the Pullman strike, for it was the employes of the Pullman company only who had a personal grievance.

Pullman was a "planned city." Many were the praises sung about the wonderful city which had been "built according to a wise plan." Owners of other businesses may have been wholly surprised since 1894 by being declared to be utilities; and the originators of the plan for Pullman may have fallen far short of the most recent notion as to the responsibilities of big business to the public. But they, at least, tried to do something in that direction. This enterprise which was well toward the front, if not the first to actually show an inclination to carry on self-supported welfare work of any kind, won praise that was all but universal, at first. But since the strike of 1894, who has praised it? Many men who belong to the so-called welfare classes were lavish in their praises at first, but in the more recent years there has been only the blight of silence, if not open criticism or antagonism.

It might be well for each utility owner and manager to ask himself: Wouldn't those very welfare workers themselves have made the Pullman mistake—if a mistake it was—and, if they had been in command of personal ability enough to do anything whatever in the nature of a self-supported "voluntary assumption of complete responsibility to the people"? If they made the mistake of praising at first the very thing which they later condemned, would not they have made the mistake if they had been the "responsible head" instead of the "praise-blame" (self-appointed) critic?

It might be well to ask this question. Prior to 1894, did anyone accept the idea of "responsibility to the public" which seems to be prevailing at present? Is there not a tremendous difference between the idea of responsibility to the public which seems to have controlled before the strike of 1894, and the idea which seems to prevail now?

Striking for self and striking for others are about as different as day is from night. In their strike in 1894 the railways were demanding nothing whatever for themselves. They were then struggling to give force to their wills concerning rights to which they claimed the Pullman employes were entitled. Now, it is a struggle to enforce their own wills, but it is concerning certain privileges which they demand for themselves. In 1894



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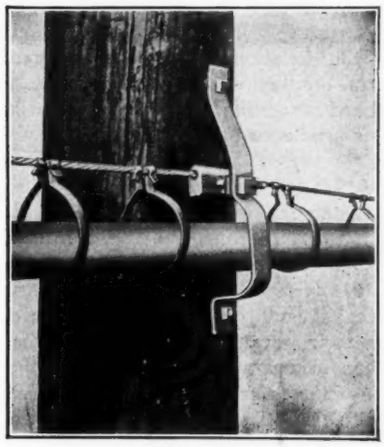

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Telephone Switchboards

One Turn of the Knob Resets to Zero

Indispensable for Making Traffic Records

One-half Size

As it is desirable that telephone exchanges learn periodically the comparative amount of work performed daily by the operators as well as the total number of calls answered daily, this counter is almost indispensable to an up-to-date exchange.

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Cyclometers for Bicycles and Motorcycles, Odometers for Automobiles and Horse Drawn Vehicles, Counters for Practically Every Possible Purpose, Tachometers, Tachodometers, and Fine Die Castings.

Please tell the Advertiser you saw his Advertisement in TELEPHONY.

they were sympathetically seeking to help men who were known to be somewhere below "the highest paid occupations among wage-earners." Now it is those of the class mentioned by the Industrial Relations Commission as exceptional because they are "in the highest paid occupations among wage-earners." They are struggling to enforce their wills with regard to still greater privileges for themselves, and with not a word of sympathy for any of the less fortunate classes of wage-seekers.

The "Master and Servant" theory was followed in the Debs or Pullman strike and is being followed, at least to a certain extent, now. There is, however, a difference as wide as the two poles between its former and its present application.

In 1894 everybody thought, talked, and acted upon the assumption that the railroad companies were the masters and the employes their servants. As late as 1909 the operators of a certain telephone company walked away from their posts at the switchboard without a moment's previous notice to the company or to anybody else. They left the people, with the receivers at their ears, to wait indefinitely without a word of warning that no response was to be forthcoming.

The manager of that company went immediately to the wide-awake editor of the leading daily paper of the city, with this question: "Why doesn't your paper take the position that the public is the most seriously aggrieved of the three parties interested in this strike?"

"To what three parties do you refer?" he inquired.

"To the operators, the company, and the public."

"Do you really think we could 'make it stick' if this paper were to assume that the operators should consider themselves responsible to the public as well as to the company?"

"You will surely agree that if the people will concede the truth, then that statement will have 'stick,' will you not?"

"Possibly you're right. Go write up the idea in the form of an editorial. If it looks safe when it is on paper, we'll try it out."

That was only seven years ago. It was in a live town whose representative in Congress, both then and now, was and is a "progressive." The editorial was produced. It was published as having been originated by the paper as a declaration of its policy. The strike was settled upon the assumption thus set forth in a city where the so-called labor influences had been "in the saddle" at the city hall for years.

This incident is mentioned to show how recent has been the beginning of this change from the former sentiment that the companies were the masters. The railway companies, including their employes, are now thought of, talked about, and treated under the assumption that the public is the master and they the servant.

This is the most important and far-reaching assumption of mastership that our public has ever made over business. It is this feature which should be most seriously considered by owners and managers of other utilities, for the breezes of public sentiment have not switched in an hour, from the direction in which they were blowing at the time of the strike of 1894 to their present quarter. The change has been gradual. It has not been possible to know always the exact angle from which these breezes have been coming. Owners and managers have had to hold themselves in readiness to meet these breezes, however, even when guessing as to their trend and velocity. This threatened strike will help the utility manager to get a more definite line on sentiment.

The presidents have had to guess at the state of public opinion, both at the time of the Pullman strike and at the present time. In 1894, President Cleveland used the military powers of the nation to "keep the mails moving, *only*." The general assumption at that time was that the movement of freight and passengers was *not a matter of sufficient public concern to warrant interference on the part of the government.*

Today, the government is operating the parcel post. If freight service were to be interrupted, the postal department of the government would be buried under the unending flow of necessities of life which people would transport by mail to avoid starving. Therefore, if President Wilson were to attempt to "keep the mails moving, only," he would have the entire freight business of the country offered at the doors of the mail cars. And wide as is the well known difference in temperament, between Presidents Cleveland and Wilson, the former, if living and in authority today, would have a different quantity of "mail" to move and a different quality of public sentiment with which to deal.

Who is willing to arbitrate? That is the question which shows most clearly and most pointedly the difference between the Pullman strike and the present controversy. It was the Pullman company and the "General Managers' Association" which refused to arbitrate in 1894. Today, it is the wage-seekers who refuse to arbitrate.

"How would you feel if you were the owner of this railroad, and saw your profits being destroyed by this sympathetic strike?" was asked of one of the clearest thinkers among the men who were beginning the sympathetic strike of 1894.

"That troubles me a great deal," was the reply. "I happen to be personally acquainted with some of the men who own large shares of this road. We have no grievance against them. It doesn't seem clear to me just what we should do. We elect men to go to Washington to study these things out for us. They should be able to fix it up. It's against the principles of our organizations to mix in economic or political matters."

In 1894 the representatives of the companies went to Washington. The president of the United States "moved the mails *only*." But as everybody, including the strikers themselves, knew that was using the power of the United States army in such manner that the sympathetic strike could not possibly win.

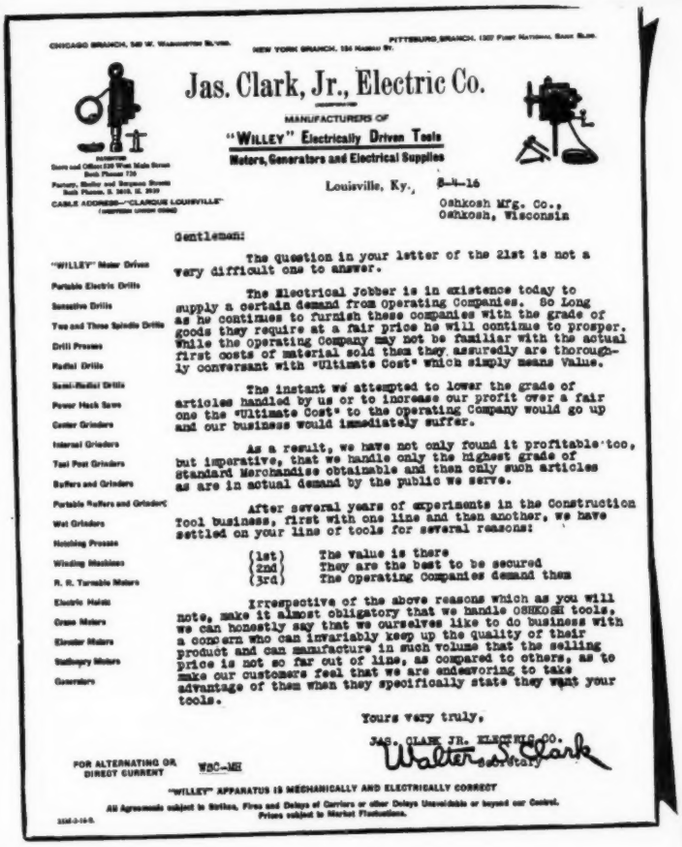
The wage-seekers are in Washington now, however, and they seem to have changed from their policy of a quarter-century ago. They not only try to teach their congressmen and senators, but they endeavor to influence the President, himself. The power which seems to be under contemplation at the moment of this writing will, if used, have exactly the opposite effect. It is the power of the government to take the reins out of the hands of the companies, until they yield to certain demands of their employes. It is as if the mayor were to take charge of your telephone company's bank account until you satisfied the labor union's demand for an increase of pay.

We will suppose that in addition to being owner of a majority of the stock, the president of the company, and possessing the title of general manager, you are foremen of the construction gang and driver of the construction motor truck. Along comes the mayor and says: "I'll drive the truck and give every order about this business until you do as the construction gang has asked me to make you do concerning their hours of work and certain other matters."

Just think of it! That foreman furnished the money for the building of the plant. He has it recorded in his name in all the recorders' offices of all the counties of all the states of the nation. He thought he had a "controlling interest." He did own more than half of the shares. He elected himself president of the company. The executive committee appointed him general manager.

He is now in practically the same condition as the owner and manager of a telephone exchange when the farmers decide to duplicate his property. Many telephone owners have lived through it. Perhaps the railroads will live through it. But it's tough!

What is needed to meet the situation? It would be presumptious to assume that one man's answer is better than another's for that question. It will pay to be awake to every principle involved. It will pay to watch closely the decisions made by the authorities that be, including the President, as to what the will of the people or the law of the land is today, as contrasted to the day of the Pullman strike. It will pay to realize that "it is the ignorance of the people which leads them



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Portable Electric Drills
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The question in your letter of the 21st is not a very difficult one to answer.

The Electrical Jobber is in existence today to supply a certain demand from Operating Companies. So Long as he continues to furnish these companies with the grade of goods they require at a fair price he will continue to prosper. While the Operating Company may not be familiar with the actual first costs of material sold them they assuredly are thoroughly conversant with "Ultimate Cost" which simply means Value.

The instant we attempted to lower the grade of articles handled by us or to increase our profit over a fair one the "Ultimate Cost" to the Operating Company would go up and our business would immediately suffer.

As a result, we have not only found it profitable too, but imperative, that we handle only the highest grade of Standard Merchandise obtainable and then only such articles as are in actual demand by the public we serve.

After several years of experiments in the Construction Tool business, first with one line and then another, we have settled on your line of tools for several reasons:

(1st) The value is there
(2nd) They are the best to be secured
(3rd) The operating Companies demand them

Irrespective of the above reasons which as you will note, make it almost obligatory that we handle OSHKOSH tools, we can honestly say that we ourselves like to do business with a concern who can invariably keep up the quality of their product and can manufacture in such volume that the selling price is not so far out of line, as compared to others, as to make our customers feel that we are endeavoring to take advantage of them when they specifically state they want your tools.

Yours very truly,

JAS. CLARK JR. ELECTRIC CO.

Walter S. Clark Secretary

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All Agreements subject to Strikes, Fires and Delays of Carriers or other Delays Unavoidable or beyond our Control. Prices subject to Market Fluctuations.

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(2nd) They are the best to be secured

(3rd) The operating companies demand them

For these three very good reasons, OSHKOSH Tools were chosen in preference to all other lines.

Mr. Clark is one speaking for many—he simply means that his trade has found by experience that the OSHKOSH line is the very best.

You're going to need tools soon—so write for a copy of the OSHKOSH catalog—we will give your nearest dealer's name along with your copy.

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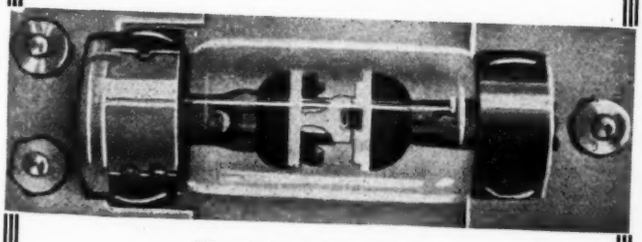
'VAC-M' Lightning Arresters

Are Always On The Job



(No. 3 Cartridge Type)

The two-line feature embodied in this make of vacuum arrester is well worth your careful consideration—the fact of each line discharging in the same evacuated container insures equal distribution and balance.

SEND FOR CATALOG—FREE.

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Sole Makers of 'VAC-M' Arresters.

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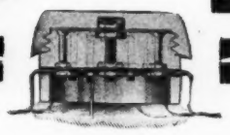

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The best protection for valuable equipment

Every Telephone, Telegraph and Railway company should, for the sake of "Safety" and "Economy" be equipped with them. RELIABLE because—the extremely low resistance affords instant relief to a charge which—due to the perfect construction—is widely distributed. One arrester will protect 15 telephones. **$1.50 Each, Net.**

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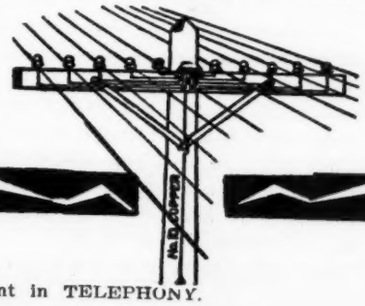


to immoral or unfair conduct toward common carriers," if they act immorally or unfairly.

"Security of investment comes primarily from the prevailing morality in the community in which the utility is operated," says an eminent utility man—the same one who stated that it is the ignorance of the people which leads to unfairness.

The first nation-wide demonstration of citizenship-sovereignty has been attempted by this organization of trainmen. Whether it is all to the good, all to the bad, or "mixed," is not as significant as the fact that it *is*. Just as it was said in 1905 that the first real work at the job of local citizenship-sovereignty was done by the rural telephone men, so it may now be said that the first nation-wide citizenship-sovereignty has been shown by these trainmen.

It needs to be repeated that this is not an attempt to decide whether or not this trainmen's quarrel is a demonstration of the right kind or of the wrong kind. We know that the rural telephone builders did much blundering. But they combined a real business of their own with their own local politics—with their own local government. It is a challenge to nation-wide educational effort concerning business. It takes its work of business education directly to the White House and the Capitol, at Washington. Above-board lobbying can no longer be condemned—surely not after the President has had 600 lobbyists in his home as invited guests.

Where do the lines of intelligent self-interest lie most nearly parallel with the public's interests? Now that the mask has been pulled entirely from lobbying, it will be well for every intelligent man to ask himself: "If these 600 "above-board lobbyists" are wrong now, or if they ever happen to be wrong, where can the best line-up be effected to correct their unjust demands?"

Undoubtedly every sober-minded man will agree that the rural population, especially of the Middle West, will be the quickest, the clearest-headed and the most powerful counter-balancing force against any evils of labor unionism which either exists or may be demonstrated later. They are well-to-do, and they are not in sympathy with many of the things which are being demanded by the labor unionists.

If the public assumes to act as master, then the managers of utilities are but the managing wage-receivers of the public's servant. If the day ever comes when the citizens of the agricultural states are convinced that the managing wage-receivers of their utilities are being imposed upon by labor unionists or managed wage-receivers, there need be no doubt whatever as to which side will have the sympathy of the agricultural states. And if there is any more hopeful gleam of light toward which to steer the utility fleet, then utility men should be discovering it. If not, they should pilot their fleet with a view to first honestly meriting; second, successfully obtaining; and third, forever retaining the confidence and sympathy of the only property-owing class which has votes enough to counter-balance any over-weaning selfishness which may be attempted by the labor unionists.

Operator Sticks to Post in Burning Lumber Yard.

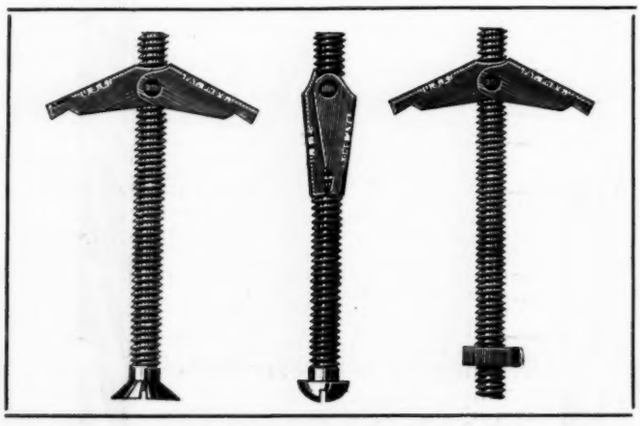
Another instance of the courage and unselfishness of telephone operators was recently demonstrated in Chicago when the planing mill and lumber yard of Rittenhouse & Embree Co., at Racine avenue and Thirty-fifth street took fire. Miss Elizabeth McFarland, an 18-year-old switchboard operator in the lumber company's office building, stuck to her post after every one else had fled and answered calls while smoke and sparks from the blazing mill whirled about her.

From Factory and Salesroom

Conventions: Indiana Independent Telephone Association, Indianapolis, September 14-15; United States Independent Telephone Association, Chicago, December 5-8

A New Toggle Bolt.

A toggle bolt which is said to be entirely automatic in its operations, and to possess holding power equal to the strength



New Toggle with Various Kinds of Bolts.

of the bolt itself, has just been placed on the market by the United States Expansion Bolt Co. The accompanying illustrations show this new toggle as used with round and flat-head stove bolts and also with threaded rod or hanger bolts. They also show toggle wings closed for insertion in the hole, and opened after having passed through the hole.

A spring inside the toggle head automatically opens the wings as soon as they pass through the hole, while the sharp arrow points grip the inner wall surface and insure instant bearing and purchase, and prevent them from turning. When the bolt threads its way through the trunnion nut and the wings are opened and in place, the inner edges of the wings bear directly on the threads of the bolt, supplying a holding power said to be equal to the strength of the bolt itself and providing a positive "lock-nut" effect which prevents work from loosening under vibration.

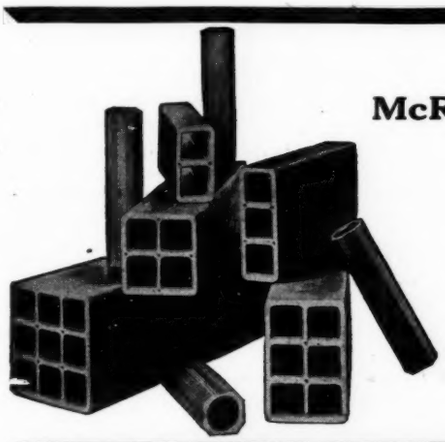
Arrow toggles are especially adapted for work in shallow holes, as the toggle wings are only one inch in length and require, it is contended, but half the depth of hollow required for successful operation of other styles of toggles. The arrow toggles will hold in corners with but a single wing opened, as each wing bears individually upon the threads of the bolt, which automatically adjusts and equalizes any irregularities on the inner wall surface.

Samples of this improved toggle may be obtained upon application to the manufacturers, the United States Expansion Bolt Co., Duane and Elm streets, New York.

Paragraphs.

The Graves Timing Device Co. reports that its Phone-Meter is meeting with much popularity among telephone companies and large users of toll service as well. Descriptive literature and further information may be obtained upon application to the company at 26th and Parkway, Philadelphia, Pa.

The Leeds & Northrup Co., 4901 Stenton avenue, Philadelphia, Pa., has just issued its Bulletin No. 250 on "The Type



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Factories East and West enable us to figure reduced freight rates, assuring you of the lowest delivered prices without sacrificing quality in any way.

Large stocks of both single and multiple duct constantly carried, thus insuring an early delivery.

Our conduits have been used for twenty-five years. Inquire about them in any city where conduits have been installed.

NATIONAL FIRE PROOFING COMPANY

Pittsburgh **New York** **Chicago** **Boston**

Replace All Your WetCells With →

Voltage 9-10
Height 10"—Weight 10 lbs.

It's Correct

in principle; high in quality; right in price. With a set of "Old Masters" you can operate your talking circuit at 1/3 your present yearly expense.

You'll come to it some day, why not investigate at once and begin **immediately** to save money by eliminating costly chemical renewal?

Your request for more information will have our prompt attention.

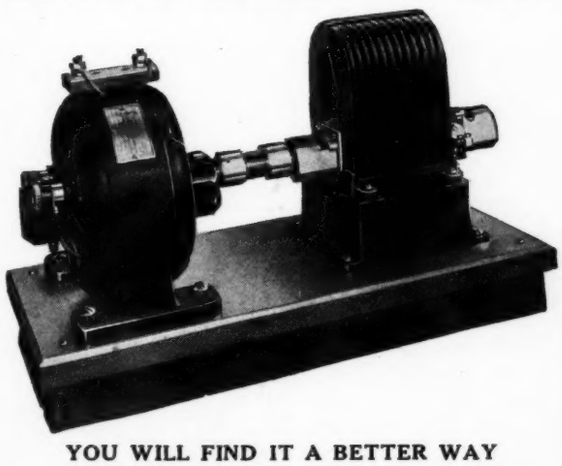
The Toledo Battery Co.

310 St. Clair St. **Toledo, Ohio**

BUY A HOLTZER-CABOT MAGNETO RINGING

MOTOR GENERATOR

AND RING YOUR SUBSCRIBERS WITHOUT BATTERIES



YOU WILL FIND IT A BETTER WAY

To begin with, war has sky-rocketed the price of batteries. Then again, run down batteries are the source of many troubles:
Operators complain that they "can't raise subscribers."
Subscribers complain about "poor service."
The manager spends much time tinkering with the worn out batteries, and perhaps travels many miles to locate probable trouble in the phone itself—all to no purpose.
PROVIDE YOURSELF WITH A STRONG, CONTINUOUS RINGING CURRENT, BY THE PURCHASE OF OUR MAGNETO RINGING MOTOR-GENERATOR.

The Holtzer-Cabot Electric Company

Chicago, Ill. **and** **Boston, Mass.**

CONDENSERS

Mansbridge Type Condensers are Self-Sealing and cannot be internally short-circuited. If one is broken down by a lightning or high-tension discharge, or by mechanical damage, it automatically and instantaneously seals up, this being the unique and characteristic property of the metallized paper.

You can drive a pin right through a Mansbridge Condenser and the capacity and insulation will still be O. K.! Sounds impossible, but it's solid fact!

Complete Satisfaction

That's the reason why the Mansbridge Condenser has made good.

Mansbridge Condensers are **More Reliable, Lighter, Smaller and no more Costly** than those of the old fashioned solid foil type.

They are made under license by Western Electric Company, Ericsson Mfg. Co., Electric Specialty Co., Stromberg-Carlson Co., American Electric Co., and by numerous other licensees all over the world.

Insist upon having MANSBRIDGE CONDENSERS.

For full particulars and for terms of manufacturing license in U. S. A. and Canada apply:

G. F. MANSBRIDGE

Mount House, New Barnet, England

R Galvanometer," which is said to be an inexpensive galvanometer of high sensitivity. Copies of this bulletin will be mailed to persons interested, upon request.

THE COFFEY SYSTEM & AUDIT CO., of Indianapolis, Ind., is making the annual audit for the Lafayette Telephone Co., Lafayette, Ind., after which it will install a new accounting system.

New Exchange Cut Over at Superior, Wis.

The Wisconsin Telephone Co., at 10 o'clock Saturday night, August 19, cut over its new "Broad" exchange at 1417 John avenue, Superior, Wis. The new exchange is a modern three-story building of Colonial design, and of reinforced concrete and brick construction.

The total expenditure in connection with the erection of the new building amounted to over $275,000, the building costing $45,000, the central office equipment $45,000 and over $185,000 being expended for outside construction work. The Wisconsin company serves 3,300 subscribers in Superior.

New Pole-Treating Plant at Minneapolis, Minn.

A $15,000 pole-treating plant has recently been completed at the Minneapolis yards of the Lindsley Brothers Co. The

New Pole-Treating Plant of Lindsley Brothers Co. at Minneapolis.

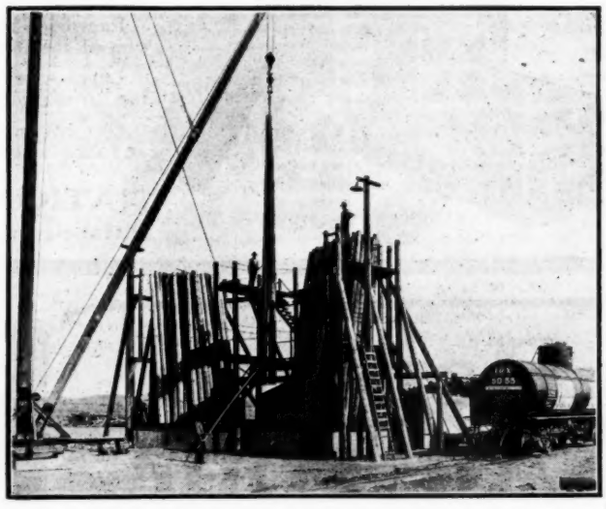
new plant consists of two large treating tanks, each 10 ft. by 18 ft. by 11 ft. deep, and two large storage tanks, each 14 ft. by 14 ft. by 14 ft. The two large tanks are set at a slight angle from each other, as will be noted in the accompanying illustrations. Just between the two large tanks, as shown in the view of the poles in process of treatment, directly underneath the platform on which one of the men is standing, is a small triangular treating tank built for the short-time treatment under the specifications "A" and "AA."

There is a smaller storage tank, 14 ft. by 14 ft. by 14 ft. deep, between the two large storage tanks. This tank is intended for storing carbolineum but it is also equipped with steam coils to be used as an auxiliary heating tank for creosote.

Between the treating tanks and the storage tanks is a chamber or pit about 10 by 10 ft. in cross section and about 9 ft. in depth. The top of this pit is flush with the ground. The treating tanks are set 8 ft. in the ground and the concrete extends about 3 ft. above the ground with the timbers on top, making the total height above the ground about 4 ft. The storage tanks are set 7 ft. below the ground level, leaving 7 ft. exposed above.

In the bottom of each of the treating tanks is a system of steam coils, used in the heating of oil during the process of treatment.

The steam pump for handling the oil and also a water pipe operated by a gasoline engine for pumping water into the storage tank, are located in the pit between the storage tanks and the treating tanks, as may be seen in the rear



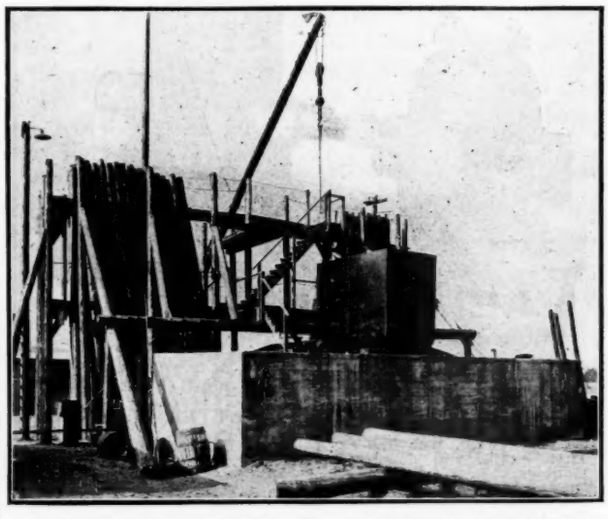
Poles in the Process of Treatment.

view of the storage tanks. There is also in this pit a system of valves so arranged that oil can be pumped directly from any one tank into any other tank. In addition to these combinations, oil can be pumped from the tank cars into either of the storage tanks, or, if necessary, directly into the treating tank.

The two large storage tanks have a capacity each of 20,000 gallons, which can be augmented, if necessary, by the small storage tank with its capacity of 4,000 gallons.

At least one carload of poles can be held by each of the treating tanks at each charge. The normal capacity will be about four carloads of poles "B" treated, per day, but this could be increased to about six if necessary.

The plant is built of concrete throughout and is said to



Rear View of Storage Tanks, Showing Concrete Construction.

be the only concrete pole-treating plant in the country, and to have the largest capacity of any treating plant now in operation.

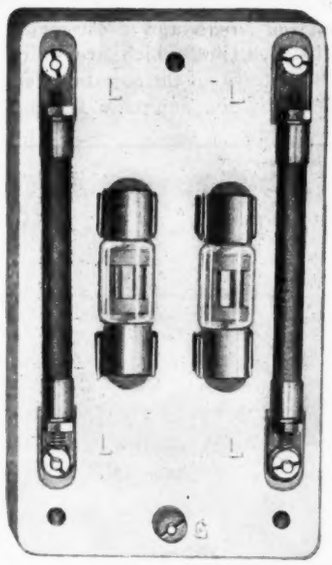
On either side of the plant are located two spur tracks running the full length of the yard and connected by switches at both ends, thus making it possible to load or

REBUILT BARGAINS

International 4-bar 1600 ohm bridging compacts	$ 5.60
Dean Electric Company 3-bar 1000 ohm bridging common battery type magneto wall sets	4.85
Vote-Berger 3-bar 1000 or 1600 ohm bridging common battery type magneto wall sets	4.70
Williams-Abbott 3-bar 1000 ohm bridging compacts	4.50
Kellogg No. 186 common battery (desk) straight line wood hotel sets	4.00
Kellogg No. 39 common battery desk sets complete with No. 75 straight line steel signal set	6.00
North Electric Company 3-bar 1000 ohm bridging compacts	4.75
Monarch No. 22 type 3-bar 1000 ohm bridging desk sets	6.30
Monarch No. 22 type 4-bar 1600 ohm bridging desk sets	7.25
Dean Electric Company No. 2315 direct current common battery Bull neck desk sets, straight line, $5.00; Harmonic with either 16-33-50 or 66 style ringer	5.75
Stromberg-Carlson No. 681 type common battery desk sets complete with 659 steel signal set, straight line, $5.00; Harmonic with either 33-50 or cycle ringer	5.50
Baird 4-bar Midget type compact cabinets	.65
New hand generator cabinets, 3-4 or 5 bar size	.35
Stromberg-Carlson No. 14A common battery induction coils	.30
Kellogg golden finish, 100-line capacity magneto switchboard fully equipped with 90 No. 3-A 100 ohm series and 10 No. 3-C 1000 ohm bridging self-restoring combined line drops and jacks, and the following operators' equipment: 10 pairs of plugs and cords, 10 listening and double ringer keys, 10 single supervision ring off drops, power and hand generator switch key, hand generator, operator's suspended type transmitter head band receiver and complete night equipment; also 13 feet of full capacity line cable from base of board	170.00

For complete list of Standard Apparatus refer to our Rebuilt Bargain Bulletin No. 6 (free on request). Stock received since Bulletin published shown in our Telephony ads.

REBUILT TELEPHONE EQUIPMENT CO.
2127-2129 W. 21st St. - Chicago, Ill.



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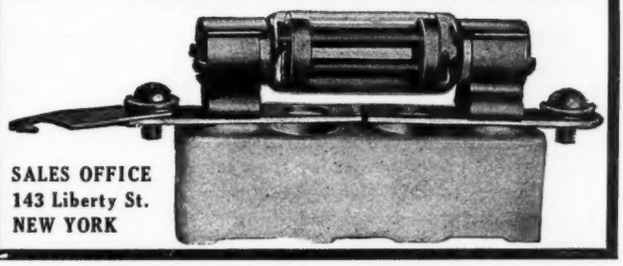

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Double Galvanized Telegraph and Telephone Wire

It's the line wire for long satisfying service ——— a good wire to have in stock.

John A. Roebling's Sons Company, Trenton, N. J.

Let the Scientists worry about amperage, voltage, resistance, etc.; what you want is reliability, service, economy. Get it by using

Red Seal Dry Batteries

absolutely guaranteed—you to be the sole judge.

Manhattan Electrical Supply Company

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No Extra Charge for Spring Clips

TELEPHONE BOOTHS

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Interchangeable Unit Office Fixtures and Partitions
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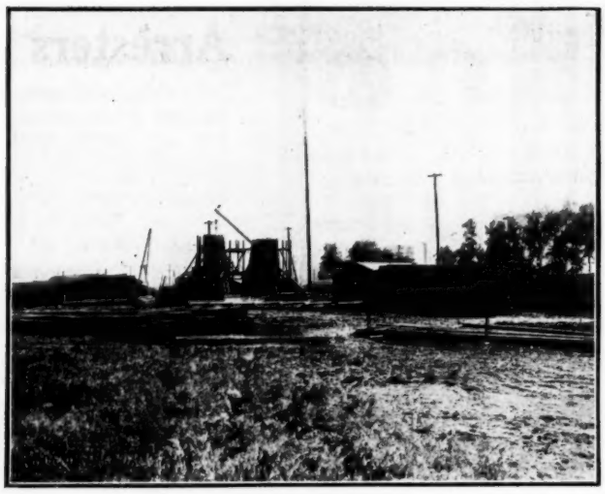
unload the poles on either side. The empty skidways, shown in one of the accompanying views, are built to accommodate shipments coming in from the North and West which are not put into stock at this yard, but which are unloaded, treated and re-loaded and forwarded to their destination.

While this plant was built by the company for its own use primarily, it is also planned to do commercial treating for other dealers who have no plant of their own, or for public service companies who prefer to place their order and have the teating done for themselves.



Portion of Minneapolis Yards with Tanks in the Distance.

In addition to this plant, the company has a small plant at Priest River, Idaho, and another at Nakusp, British Columbia. These two plants handle about one carload of poles "B" treated, per day. The company is now building another large plant at Sandpoint, Idaho, which will give an additional four cars per day.

The Lindsley Brothers Co. has offices at both Minneapolis, Minn., and Spokane, Wash.

Address of Chief Operator to Members of Her Staff.

A part of the operating efficiency work of the Central Home Telephone & Telegraph Co. involves addresses from the chief operators to the members of the operating staffs under them, at intervals. These are ordinarily typewritten messages of about 200 words, and are posted on the bulletin boards at the various exchanges. A good example of these addresses is a recent one of Miss Celia L. Stephenson, chief operator of the Bowling Green exchange, of the Bowling Green Home Telephone Co. Miss Stephenson recently went to Bowling Green from Marion and under her direction the situation at Bowling Green has been improved. Her address to the operators follows:

"I want to express my appreciation for the interest shown by the operating department since I have been with you, but as yet we are not satisfied. Our aim is to reach 100 per cent. efficiency and we realize that it takes that wide-awake, get-together spirit to accomplish this undertaking.

We all know the chief obligation to the company is to render satisfactory service to its patrons. Therefore it behooves one and all to do their very best in every phase of our work to make a model exchange.

We are expected by our general manager to make a gain of 175 telephones at the Bowling Green exchange for the year ending July 1, 1917. In order to accomplish this, each department will have to do its work in a very efficient way, and especially the operating department, which can do more to bring about these good results than any of the other departments. Our department is in direct touch with the public and it is through you that the public forms its opinion of the public and you can make this opinion either good or bad.

It is all a question of efficiency, which of course depends on the individual.

E—Efforts
must be
F—Found
in every
F—Form
and every
I—Individual
in your
C—Company
to
I—Improve
our
E—Efficiency.

N—Now
may we
C—Count
upon
Y—You?

Study this outline of efficiency and apply it to yourself, and each and every one, as well as the company, will be greatly benefited."

Trouble Time.

When the temperature is zero
And the sleet king holds the track,
When the wires pack a burden
That would break a giant's back,
And the misty air congealeth
From an over generous sky,
Would you, under such conditions,
Like to be the trouble guy?

Bad Debts Collect them yourself with a
SAYERS SYSTEM
Collection Cabinet

Over 40,000 now in use. Results guaranteed.
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